Newspaper Analysis Programe™
WORKSHEET -11 (UPSC PTcumMAINS-2020)
(AIR POLLUTION AND SOLUTION)

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Air Pollution- Solution Paper-3 (PT-MAINS)

NEWSPAPER ANALYSIS PROGRAMME – WORK-SHEET

Part - 11

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Air pollution

The atmosphere is the gaseous envelope surrounding our planet and consists of:

1. nitrogen (79.1%)
2. oxygen (20.0%)
3. carbon dioxide (0.03%)

Traces of other gases like argon, krypton, xenon, neon, helium, water vapour, ammonia, ozone and suspended particles (0.07%).

But today, the percentage of carbon dioxide has increased causing the greenhouse effect due to which the earth is heating up, the polar ice caps are melting, and the ozone layer is disturbed.

We need oxygen for our existence.

Air Pollution

Air pollution can be defined as the presence of toxic chemicals or compounds (including those of biological origin) in the air, at levels that pose a health risk.

All human activity from domestic cooking to highly mechanised industries contributes to air pollution.

In India alone, stupendous amounts of air pollutants enter the atmosphere per annum. The pollutants comprise of 50 lakh tonnes of particulate matter, 30 lakh tonnes of sulphur dioxide, 10 lakh tonnes of carbon monoxide and 22 lakh tonnes of hydrogen sulphide.

Air pollution can be due to natural or man-made causes. The former is beyond our control as natural disasters like dust storms, earthquakes and volcanic eruptions throw up large quantities of dust and gases into the atmosphere.

Man-made causes, however, should be prevented or controlled as they pose a greater danger by way of toxic emissions from factories, power plants, vehicular traffic, etc. Industries such as mining, thermal plants, brick kilns, etc. also pollute the air. These emissions are particularly intense in urban conglomerations where the density of human habitation is very high.

Types of air pollutants

Primary pollutants are those which are emitted directly into the atmosphere, like sulphur dioxide, nitric oxides and carbon monoxide.

Secondary pollutants are pollutants formed by the photochemical reaction of primary pollutants. For example, "smog", is a combination of smoke and fog. Smoke consists of carbon particles and fog is an emulsion of water vapour in air. Smog has become very common in large cities, especially during winter. Similarly acid rain is formed by the combination of sulphur dioxide and water vapour present in the air.

Pollutants in the air can be dispersed by wind movement, temperature and topography.

Major air pollutants and their effect on human health

Other effects of air pollution (PT)

Ozone causes reduced pollination and yellow spot formation on leaves, thus affecting the rate of photosynthesis.

Sulphur dioxide is converted to sulphuric acid in the presence of moisture and iron, which are present in dust, nails, etc. This results in yellowing,weakening and corrosion of materials.

Domestic Pollution

The worst form of air pollution could be the wood smoke inhaled by women while cooking.

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(AIR POLLUTION AND SOLUTION)

Automobile Pollution

The vehicular population is of three principal types:

Passenger cars and jeeps powered by four-stroke engines.

Two and three wheelers powered by small two-stroke gasoline engines.

Buses, trucks and light commercial vehicles powered by four-stroke diesel engines.

The major emissions from a gasoline powered engine are mainly carbon monoxide (CO), unburned hydrocarbons (HC), oxides of nitrogen (NOx) and others like formaldehyde, acetaldehyde, acrolein and benzaldehyde. Among the particulates, lead is the major significant toxic compound. Indian petrol contains a high percentage of lead, whose emission leads to lung diseases and cancer.

Thermal Power Stations

All thermal power plants are coal-fired. The major effluents from these plants are fly ash, soot and sulphur dioxide. The sulphur content of Indian coal is less than one percent. But the coal contains a high ash content, in the range of 25 % to 40 %. Fly ash from power stations reduces visibility and contains traces of chromium, arsenic, cadmium, mercury, lead, manganese, etc. Once again, these affect human health.

Fertiliser Factories

Fertiliser plants produce large quantities of air pollutants. Some of them are fluorine, ammonia, sulphur dioxide, nitrogen oxides and particulates. Although fertilisers are essential for boosting agricultural production, their production has many ill effects, such as health-affecting emission of gases, etc.

Textile Mills

The major effluents from textile mills are cotton dust, smoke and other combustion wastes, kerosene or naptha vapours, sulphuric acid, nitrogen oxide, chlorine, formaldehyde, etc. The surroundings of textile mills are generally dusty with deposits of cotton fluff. Continuous inhalation of cotton fluff causes lung disorders.

Acid rain

Acid rain is the outcome of the emission from industries releasing sulphur and oxides of **nitrogen**. When these oxides come into contact with water vapour, acids result, with dramatic effects. There is an increased acidity of the soil, damage to crops and forests and frequently, the death of fish in lakes and rivers is observed. Acid rain indirectly mobilises heavy metals such as cadmium and mercury, which are absorbed by plants and enter the food chain.

Ozone Layer

The earth is protected from the sun's ultraviolet radiation by a layer of ozone high up in the stratosphere. Without this layer of ozone, life would have been impossible. But, again, due to human intervention there is a disruption of the ozone layer leading to certain types of skin cancer. Ozone is continuously produced and decomposed. The quantity of ozone is relatively less (3,300 million tonnes) compared to 3865 million tonnes of nitrogen. Some of the factors which lead to the disruption of the ozone layer are the increased release of nitrogen oxides into the atmosphere, the increase of supersonic aircraft (SSTs) and the presence in the atmosphere of Chlorofluorocarbon (CFCs) which are used as refrigerants, in fire extinguishers and as propellants in aerosol spray cans.

Greenhouse Effect

Carbon dioxide may be an insignificant gas, a mere 0.03% of the earth's atmosphere, but plays a useful role in absorbing the radiant energy of the sun. Due to industrial activity the carbon dioxide

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(AIR POLLUTION AND SOLUTION)

level in the atmosphere has increased substantially.

The effect of carbon dioxide on the temperature of the earth is what is termed the "Greenhouse Effect". It behaves like the glass in a greenhouse, allowing the heat from the sun through to the earth but preventing some of it from being radiated back through the atmosphere. Carbon dioxide traps more heat and thereby increases the earth's temperature. Scientists fear that if the temperature rises by even a few degrees, it will melt the polar ice caps which, in turn will submerge vast areas of land.

Dirty air killing Indians early and in large numbers

The current high level of air pollution has shortened the average lifespan of a South Asian child by two-and-a-half years while globally the reduction stands at 20 months, according to a global study released.

State of Global Air 2019, published by Health Effects Institute (HEI), said exposure to outdoor and indoor air pollution contributed to over 1.2 million deaths in India in 2017. The report added that worldwide, air pollution was responsible for more deaths than many better-known risk factors such as malnutrition, alcohol abuse and physical inactivity.

In India, air pollution is the third-highest cause of death among all health risks, ranking just above smoking; each year, more people globally die from air pollution related disease than from road traffic injuries or malaria.

In China and India

The study found that China and India together were responsible for over half of the total global attributable deaths, with each country witnessing over 1.2 million deaths from all air pollution in 2017. China has made initial progress, beginning to achieve air-pollution decline.

Overall, long-term exposure to outdoor and indoor air pollution contributed to nearly 5 million deaths from stroke, diabetes, heart attack, lung cancer, and chronic lung disease in 2017.

Out of these, 3 million deaths are directly attributed to PM2.5, half of which are from India and China together. The South Asian region — Bangladesh, India, Nepal and Pakistan — led the world as the most polluted, with over 1.5 million air-pollution related deaths according to the report.

Steps taken in India'

"At the same time, India has initiated major steps to address pollution sources: the Pradhan Mantri *Ujjwala Yojana Household LPG program, accelerated Bharat Stage 6/VI clean vehicle standards, and the new National Clean Air Programme*. These and future initiatives have the potential, if fully implemented as part of a sustained commitment to air quality, to result in significant health benefits in coming years,".

Meanwhile, for the first time, this year's report and website include worldwide estimates of the effect of air pollution on life expectancy.

Worldwide, air pollution reduced life expectancy by an average of 20 months in 2017, a global impact rivalling that of smoking; this means a child born today will die 20 months sooner, on average, than would 7be expected without air pollution.

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(AIR POLLUTION AND SOLUTION)

The report also highlighted that nearly half of the world's population — a total of 3.6 billion people — were exposed to household air pollution in 2017. Globally, there has been progress: the proportion of people cooking with solid fuels has declined as economies develop.

But in India, 60% of the population still uses solid fuels; in Bangladesh that number rises to 79%, underscoring the importance of achieving success in government initiatives to address the problem.

India is running against time and the pollution levels and health risk must decline significantly to offset the health impacts from growing numbers and ageing — the essential part of demographic transition. The new report thus also provides the positive inducement that life expectancy can improve if air pollution is reduced. Clearly therefore, steps are needed in leaps and not in small steps.

Government steps to curb air pollution

1.National Ambient Air Quality Standards;

National Ambient Air Quality Standards are the standards for ambient air quality set by the Central Pollution Control Board (CPCB) that is applicable nationwide. The CPCB has been conferred this power by the Air (Prevention and Control of Pollution) Act, 1981.

2. National Air Quality Index (AQI) has been launched for monitoring the quality of air in major urban centres across the country on a real-time basis and enhancing public awareness for taking mitigate action. The Union Environment Ministry proposes to extend the measurement of air quality to 22 state capitals and 44 other cities with a population exceeding one million.

Salient features of the Index:
AQI will consider eight pollutants (PM10, PM2.5, NO2, SO2, CO, O3, NH3, and Pb) for which short-term (up to 24-hourly averaging period)

• The unit of measurement is microgram (or milligram in the case of CO) per cubic meter.

The AQI has been at present launched for 10 cities -- Delhi, Agra, Kanpur, Lucknow, Varanasi, Faridabad, Ahmedabad, Chennai, Bangalore and Hyderabad.

• The AQI has been developed by the Central Pollution Control Board in consultation with IIT-Kanpur and an expert group comprising medical, air-quality professionals and other stakeholders.

• India has joined the global league of countries like the US, China, Mexico and France that have implemented smog alert systems.

3. SAFAR

The System of Air Quality and Weather Forecasting and Research (SAFAR) is a national initiative introduced by the *Ministry of Earth Sciences (MoES)* to measure the air quality of a metropolitan city, by measuring the overall pollution level and the location-specific air quality of the city.

The system is indigenously developed by the Indian Institute of Tropical Meteorology (IITM), Pune and is operationalized by the India Meteorological Department (IMD).

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(AIR POLLUTION AND SOLUTION)

It has a giant true color LED display that gives out real-time air quality index on a 24x7 basis with color-coding (along with 72 hours advance forecast).

The ultimate objective of the project is to increase awareness among the general public regarding the air quality in their city so that appropriate mitigation measures and systematic action can be taken up.

It organizes awareness drive by educating the public (prompting self-mitigation), and

It also helps the policy-makers to develop mitigation strategies keeping in mind the nation's economic development.

SAFAR is an integral part of India's first Air Quality Index operational in Delhi.

It monitors all weather parameters like temperature, rainfall, humidity, wind speed, and wind direction, UV radiation, and solar radiation.

4.Pradhan Mantri Ujjwala Yojana

According to WHO estimates, about 5 lakh deaths in India alone due to unclean cooking fuels. Most of these premature deaths were due to non-communicable diseases such as heart disease, stroke, chronic obstructive pulmonary disease and lung cancer. Indoor air pollution is also responsible for a significant number of acute respiratory illnesses in young children. According to experts, having an open fire in the kitchen is like burning 400 cigarettes an hour.

Providing LPG connections to BPL households will ensure universal coverage of cooking gas in the country. This measure will empower women and protect their health. It will reduce drudgery and the time spent on cooking. It will also provide employment for rural youth in the supply chain of cooking gas.

Target beneficiaries

Under the scheme, an adult woman belonging to a poor family not having LPG connection in her household, is an eligible beneficiary under the expanded scheme.

Release of LPG connection under this Scheme shall be in the name of the women belonging to the BPL family.

Initially, the Government covered the following categories under the Scheme :-

Beneficiaries listed in the SECC 2011 list

All SC/STs households beneficiaries of Pradhan Mantri Awas Yojana(PMAY) (Gramin)

Antyoday Anna Yojana (AAY)

Forest dwellers

Most Backward Classes (MBC)

Tea & Ex-Tea Garden Tribes

People residing in Islands

People residing in river islands.

5. BSVI. Bharat Stage Emission Standards

These are enforced by the Government of India to regulate the expelled pollutants from motor vehicles. The Central Pollution Control Board, which is governed by the Ministry of Environment, Forest and Climate Change sets the standard for these emissions.

Bharat Stage Emission Standards were first introduced in 2000 as 'India 2000'.

They were followed by BS2 and BS3 in 2005 and 2010 respectively, while the ongoing BS4 standards were enforced in 2017.

However, considering the increasing need to make emission norms stricter, the government has decided to imply BS6 norms directly, skipping BS5 in the process.

BS6 compliant petrol vehicles are required to be 25 percent cleaner by reducing NOx (Nitrogen Oxide) numbers from 80mg/km to 60mg/km. For
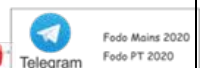
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diesel cars, the BS6 norms aim at reducing three pollutants which include HC (Hydrocarbons) + NOx, PM (Particulate Matter) and NOx reduction by 43, 68 and 82 per cent respectively.

The BS6-compliant engines make use of modern technology to attain these targets. Some of these include Lean NOx traps (LNTs), selective catalytic reduction (SCR) units, and diesel particulate filters (DPFs).

In 2016, the Indian government announced that the country would skip the BS V norms altogether and adopt BS VI norms by 2020.[4] In its recent judgment, the Supreme Court has banned the sale and registration of motor vehicles conforming to the emission standard Bharat Stage IV in the entire country from 1 April 2020.

6. FAME India (Faster Adoption and Manufacture of (Hybrid and) Electric Vehicles) Scheme is an incentive scheme for the promotion of electric and hybrid vehicles in the country. Ultimate objective of the scheme is to promote electric mobility and incentive is provided in the form of subsidies to manufactures of electric vehicles and infrastrcuture providers of electric vehicles.

FAME was launched by the Ministry of Heavy Industries and Public Enterprises in 2015 to incentivize the production and promotion of eco-friendly vehicles including electric vehicles and hybrid vehicles.

The Scheme operates in two phases.
Phase I: started in 2015 and was completed on March 31st, 2019.
Phase II: started from April 1st, 2019, will be completed by March 31st, 2022.

Features of FAME
FAME India is a part of the National Electric Mobility Mission Plan ,launched in 2013 to achieve sales of six-seven million units of electric vehicles and thus to realise fossil fuel saving of 2.2 to 2.5 million tonnes. Under the NEMMP scheme, the government aimed to invest Rs 14000 crore in creating infrastructure and promoting the use of electric vehicles.

Vehicles in most segments – two wheelers, three wheelers, electric and hybrid cars and electric buses obtained the subsidy benefit of the scheme.

Focus areas of FAME
The scheme covers Electric and Hybrid technologies like Mild Hybrid, Strong Hybrid, Plug in Hybrid & Battery Electric Vehicles.
FAME focuses on 4 areas i.e. Technology development, Demand Creation, Pilot Projects and Charging Infrastructure.

FAME II
The second phase is an expanded version of the first phase. FAME India Phase II has a total outlay of Rs 10000 Crores over the period of three years from 1st April 2019 to 2022.

FAME-II will cover buses using EV technology; electric, plug-in hybrid and strong hybrid four wheelers; electric three-wheelers including e-rickshaws and electric two-wheelers.

For the overall monitoring, sanctioning and implementation of the scheme, an inter-ministerial empowered committee – 'Project Implementation and Sanctioning Committee' (PISC) that is headed by the heavy industry secretary,

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7. RENEWABLE PURCHASE OBLIGATION AND RENEWABLE PURCHASE CERTIFICATE

RPO is Renewable Purchase Obligation.

This is a mechanism by which the State Electricity Regulatory Commissions are obliged to purchase a certain percentage of power from renewable energy sources. RPO is being implemented throughout the country to create demand for renewable energy.

RPO is of two categories – (a) Non Solar & (b) Solar.

Solar RECs include both PV and CSP technologies. Non-solar RECs include renewable energy technologies such as biomass, wind, biofuel, cogeneration & small hydro.

RPOs are enforced on three categories of consumers – (a) Distribution Licensees, (b) Open Access Consumers & (c) Captive Consumers.

Renewable Energy Certification (REC)

RECs are aimed at addressing the mismatch of renewable energy resources in the States and their RPO requirements. Obliged entities can fulfill their RPOs by purchasing RECs.

RECs are traded on the Indian Energy Exchange (IEX) and the Power Exchange of India Ltd (PXIL).

In a bid to promote renewable energy market in India, the Indian government has framed policies under the Electricity Act, 2003 and the National Action Plan on Climate Change (NAPCC) to increase the total renewable power generation capacity in the country.

Renewable Energy Certificates (REC) is a policy instrument to catalyze the development of renewable energy.

8. National Clean Air Program (NCAP) provides a roadmap to prevent, control, and reduce unhealthy air pollution.

With the alarming air pollution levels across India the urgency of the plan is clear. India is severely affected by air pollution; it led to 1.24 million or 12.5% of the total deaths recorded in the country during 2017 alone.

The NCAP will expand the national air quality monitoring network, build capacity for air pollution management, and strengthen public awareness about the dangers of air pollution.

It is a time-bound, national strategy to bring down levels of deadly particle air pollution (PM2.5 and PM10) by 20-30% by 2024 (compared to 2017 levels).

The NCAP clearly brings much needed focus to city actions that can help the country achieve cleaner air.

Under the NCAP, city-specific action plans will be developed for all 102 cities that exceed national air quality safeguards.

The Smart Cities Mission of the Indian Government will now also be leveraged to launch clean air programs for the 43 smart cities in the list of non-attainment cities.

Other measures
1. Taxing polluting vehicles and incentivizing hybrid and electric vehicles; .

2. Comprehensive amendments to various Waste Management Rules including Municipal Solid Waste, Plastic Waste,

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(AIR POLLUTION AND SOLUTION)

Hazardous Waste, Bio-medical Waste and Electronic Waste notified; .

3. Notification of Construction and Demolition Waste Management Rules; .

4. Ban on burning of leaves, biomass, municipal solid waste; .

5. Promotion of public transport network of metro, buses, e-rickshaws and promotion of car pooling, Pollution Under Control, lane discipline, vehicle maintenance; .

6. Revision of existing environmental standards and formulation of new standards for prevention and control of pollution from industries;

7. Installation of on-line continuous (24x7) monitoring devices by major industries. .

Delhi Government while formulating the Master Plan of Delhi 2001 had categorized all hazardous/ noxious/ heavy and large industries into H category for the purpose of stopping and shifting the identified industries out of the National Capital Territory of Delhi. There is no standard categorization of industries under H category from pollution perspective. The Central Pollution Control Board has categorized the industries into Red, Orange, Green and White category based on the composite scores which is calculated on the basis of air pollution, water pollution score and hazardous waste generation. As per this classification, Red category covers 60 industrial sectors, Orange category covers 83 industrial sectors, Green category covers 63 industrial sectors and the newly introduced, White category

covers 36 industrial sectors. CPCB had issued directions under section 18(1)(b) of the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 to all State Pollution Control Boards / Pollution Control Committees (SPCBs / PCCs) on 07.03.2016 to harmonize the criteria of classification of industries.

India air pollution: Will Gujarat's 'cap and trade' programme work? (EDITORIAL)

The concentration of tiny particulate matter (known as PM2.5) in India is eight times the World Health Organization's standard.
These particles are so tiny that they can enter deep into the lungs and make people susceptible to respiratory and cardiovascular diseases, making them extremely deadly.
Air pollution in India is caused by fumes from cooking on wood or dung indoors in villages, and a combination of traffic exhaust, soot and construction dust and factory emissions in the cities.
Now Gujarat has launched the world's first "cap and trading" programme to curb particulate air pollution.

Put simply, the government sets a cap on emissions and allows factories to buy and sell permits to stay below the cap.
It is being launched in the dense, industrial city of Surat, where textile and dye factories are a major source of pollution. Since 2011, local pollution control authorities have been working on the impact of emissions trading in Surat, along with the University of Chicago and Harvard University.

How will this programme work?

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The basic commodity in the emissions trading system is particulate matter, which is emitted by industries through their smoke stacks.

Under the emissions trading system, industries must hold a permit for each unit of particulate that they emit, and must comply with the prescribed standard of 150 milligrams per cubic metre of particulate matter released in the atmosphere.

Although industries can trade permits among themselves, the total quantity of these permits are fixed, so that air pollution standards are met.

For example, an industry that finds it inexpensive to decrease emissions is likely to over-comply with the standards - this would allow them to sell its excess permits to another industry that finds it more expensive to decrease emissions.

Both industries benefit by reducing their total costs of compliance, while the total emissions are held constant.

Importantly, this trading system gives firms an incentive to find ways to reduce emissions because they are able to sell any extra reductions to other firms.

These incentives have been shown to prompt firms to innovate so that they find new and inexpensive ways to reduce their emissions.

This standard will be used to set the overall emissions from all the industries that are participating in the pilot programme.

In 2015, the environment ministry ordered 17 highly polluting industries - such as pulp and paper, distillery, sugar, tanneries, power plants, and iron and steel - to mandatorily install continuous emission monitoring system (CEMS) devices. They are a network of sensors installed in factories that send live readings of pollution emitted through their smoke stacks. Gujarat 's pilot project is part of this order, with proper analysis so that , if successful can be implemented nationally

Will this ambitious programme work?
Siddharth Singh, energy expert and author of The Great Smog of India, says the emissions trading scheme has the potential to work.

"Firstly, unlike in other countries, emission trading schemes are not a politically sensitive topic, so it could quietly be tested and scaled up if it proves to be successful. Secondly, India has some experience in running a similar scheme."

India's Bureau of Energy Efficiency has been running a programme to improve industrial energy efficiency. It targets some 500 large users of energy across India and encourages trade in energy efficiency certificates. This has led to decreased energy use and emissions, as well as cost savings.

Source: The Hindu-The Live mint- GoI

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Class explanation- mind map

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Q. Discuss the reason behind high Air Pollution in India and government measure to control it.   (10 Marks)

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