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ESE- 2020 (Prelims) - Offline Test Series

Test-16

GENERAL STUDIES AND ENGINEERING APTITUDE

SUBJECT: BASICS OF ENERGY AND ENVIRONMENT SOLUTIONS

01. Ans: (c)

- Sol: The examples of natural carbon sink:
 - Absorption of carbon dioxide by the oceans.
 - Photosynthesis by terrestrial plants.

02. Ans: (b)

Sol: Biochemical oxygen demand (BOD) is the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present in a given water sample at certain temperature over a specific time period. It measures the degree of organic pollution of water. Higher the pollution means higher organic matter present in the water which means higher oxygen demand, i.e., high BOD.

03. Ans: (a)

Sol: When black carbon is deposited on ice absorbance of insolation. promotes decreases albedo (reflectivity) and promotes melting of ice.

04. Ans: (a)

Sol: TRAFFIC, the wildlife trade monitoring network, is a joint program of WWF and IUCN – the International Union for Conservation of Nature. TRAFFIC works to ensure that trade in wild plants and animals is not a threat to the conservation of nature.

TRAFFIC has gained its greatest reputation from supporting CITES, the Convention on International Trade in Endangered Species.

05. Ans: (a)

- Sol: Organisms in the ecosystem are related to each other through feeding mechanism or trophic levels, i.e. one organism becomes food for the other. A sequence of organisms that feed on one another, form a food chain. A food chain starts with producers and ends with top carnivores. The sequence of eaten and being eaten, produces transfer of food energy and it is known as food chain.
 - A food chain represents only one part of the food or energy flow through an ecosystem and implies a simple, isolated relationship, which seldom occurs in the ecosystems. An ecosystem may consist of several interrelated food chains. More typically, the same food resource is part of more than one chain, especially when that resource is at the lower trophic levels









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06. Ans: (d)

Sol: Bio-accumulation and Bio-Magnification should be interchanged.

Bioaccumulation

- It refers to how pollutants enter a food chain.
- In bioaccumulation there is an increase in concentration of a pollutant from the environment to the first organism in a food chain

Biomagnification

Biomagnification refers to the tendency of pollutants to concentrate as they move from one trophic level to the next.

• Thus in biomagnification there is an increase in concentration of a pollutant from one link in a food chain to another

07. Ans: (a)

Sol: Nutrient cycling has nothing to do with biotic interaction. It is a process of nutrients recycling, while biotic interactions like mutualism, communalism describe the relationship status among living organisms for food.

08. Ans: (c)

Sol: Ozone is a form of oxygen. The molecule contains three oxygen atoms. Ozone is unstable and will readily combine with other atoms. Ozone is found in the stratosphere, where it blocks the sun's ultraviolet (UV) waves and prevents them from reaching the earth's surface. Ozone is also found in the troposphere, where it can damage living tissue and human-produced objects. It is generated both from certain types of pollution and natural sources.

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09. Ans: (d)

Sol: Option 1 is wrong because the marine biodiversity tends to be highest where sea surface temperature is highest and in the mid-latitudinal band in all oceans. Option 2 is also wrong because the biodiversity is richest in the tropics (near the equator). Terrestrial biodiversity tends to be greater near the equator, which seems to be the result of the warm climate and high primary productivity.

10. Ans: (c)

Sol: Soil erosion results in the loss of soil fertility and makes the land barren. There are more than 25 million hectares of barren lands in the world now.

> The main cause of soil erosion is the removal of vegetation. Vegetation removal takes place due to removal of forest covers. Unscientific farming has also led to barren lands.

> The removal of vegetation exposes the topsoil to water and wind. Water and wind cause the topsoil to be removed.

11. Ans: (c)

- Sol: Acidification of problems: soils causes following
 - Phosphorus in the soil may become less available to plants.
 - Induced deficiencies of calcium, magnesium and molybdenum.
 - The ability of plants to use subsoil moisture may be limited.
 - Aluminum, which is toxic to plants and microorganisms, may be released from the soil.
 - Manganese may reach toxic levels.
 - Uptake of cadmium (a heavy metal contaminant) by crops and pastures may increase.

12. Ans: (a)

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Sol: Vermicompost decreases the greenhouse gas emissions such as methane and nitric oxide (produced in landfills or incinerators when not composted).

13. Ans: (c)

Sol: The mangroves' massive root systems are efficient at dissipating wave energy. They slow down tidal water enough so its sediment is deposited as the tide comes in. leaving all except fine particles when the tide ebbs. In this way, mangroves build their environments. Because of own the uniqueness of mangrove ecosystems and the protection against erosion they provide, they are often the object of conservation programs, including national biodiversity action plans.

14. Ans: (d)

Sol: Biodiversity helps in all of them including soil formation.

15. Ans: (c)

Sol: Biomass gasification means incomplete combustion of biomass resulting in production of combustible gases consisting of carbon monoxide (CO), hydrogen (H2) and traces of methane (CH4). This mixture is called producer gas.

16. Ans: (d)

- **Sol:** Oceans are an important reservoir for CO2, absorbing a significant quantity of it (one-third) produced by anthropogenic activities and effectively buffering climate change.
 - Increasing acidity depresses metabolic rates and immune responses in some organisms.
 - The decrease in the amount of carbonate ions available makes it more difficult for marine calcifying organisms, such as coral (calcareous corals) and some

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:4: General Studies & Engineering Aptitude

plankton (calcareous plankton), to form biogenic calcium carbonate.

- Increasing acidity accentuates coral bleaching as corals are very sensitive to changes in water composition.
- The majority of sulphur in the atmosphere is emitted from the ocean, often in the form of dimethylsulfide (DMS) produced by phytoplankton.
- Some of DMS produced by phytoplankton enters the atmosphere and reacts to make sulphuric acid, which clumps into aerosols, or microscopic airborne particles.
- Aerosols seed the formation of clouds, which help cool the Earth by reflecting sunlight.
- But, in acidified ocean water, phytoplankton produces less DMS.
- This reduction of sulphur may lead to decreased cloud formation, raising global temperatures.

17. Ans: (d)

Sol: The ability to absorb and re-emit infrared energy is what makes CO_2 an effective heattrapping greenhouse gas. Not all gas molecules are able to absorb IR radiation. For example, nitrogen (N₂) and oxygen (O₂), which make up more than 90% of Earth's atmosphere, do not absorb infrared photons. CO_2 molecules can vibrate in ways that simpler nitrogen and oxygen molecules cannot, which allows CO_2 molecules to capture the IR photons.

18. Ans: (a)

Sol: Except promotion of vegetarianism all other acts are threats to the biodiversity of a geographical area.

19. Ans: (b)

Sol: Diclofenac is an Anti-Inflammatory Drug is used by Farmers to treat their Diseased Cattle. But unfortunately, Diclofenac is Fatal to Vultures. When Vultures consume the Dead bodies of Livestock treated with Diclofenac, as it is Poison for them, they die within few days after consumption of the carrion.

20. Ans: (c)

Sol: The Bombay Natural History Society is one of the largest non-governmental organizations in India engaged in conservation and biodiversity research. It strives to conserve nature through actionbased research, education and public awareness. It organizes and conducts nature trails and camps for the general public.

21. Ans: (a)

Sol: Photovoltaics' is a technology that generates electricity by direct conversion of light into electricity, while 'Solar Thermal' is a technology that utilizes the Sun's rays to generate heat which is further used in electricity generation process. Both Photovoltaic cells and solar thermal generate (DC). India direct current has а manufacturing base for both.

22. Ans: (b)

Sol: Global Greenhouse Gas Emissions by Economic Sector



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23. Ans: (c)

Sol: Bioremediation is a process used to treat contaminated media, including water, soil and subsurface material. by altering environmental conditions to stimulate growth of microorganisms and degrade the target pollutants.

24. Ans: (c)

Sol: Many emission focus standards on regulating pollutants released by automobiles (motor cars) and other powered vehicles, but they can also regulate emissions from industry, power plants, small equipment, such as lawn mowers and diesel generators. Frequent policy alternatives to emission standards are technology standards (which mandate the regulation of emissions of nitrogen oxides [NOx], sulphur oxides, particulate matter [PM] or soot, carbon monoxide [CO], or volatile hydrocarbons).

25. Ans: (a)

Sol: Established in 1994, the United Nations Convention to Combat Desertification (UNCCD) is the sole legally binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry subhumid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. India became a signatory in 1994 and ratified it in 1996.

26. Ans: (d)

Sol:

- 1. Oil spills at sea decrease the oxygen level in the water and cause harm to the organisms. Increase in oxygen levels to some extent is a positive aspect.
- 2. Since crude oil is lighter than water, it floats on the surface and poses the threat of swift spreading fire.

27. Ans: (d)

Sol: Acid rain generally leads to weathering of buildings, corrosion of metals, and peeling of paints on surfaces. Erupting volcanoes contains some chemicals that can cause acid rain. Apart from this, burning of fossil fuels, running of factories and automobiles due to human activities are few other reasons behind this activity.

28. Ans: (d)

- Sol: 1. Production of plastic foams
 - 2. Production of tubeless tyres
 - 3. as Pressurizing agents in aerosol cans
 - 4. in cleaning certain electronic components

29. Ans: (c)

- Sol: Project Tiger centrally sponsored scheme was launched in 1973 with the following objectives:
 - To ensure maintenance of available population of Tigers in India for scientific, economic, aesthetic, cultural and ecological value
 - To preserve, for all times, the areas of such biological importance as a national heritage for the benefit, education and enjoyment of the people

Aim

- Conservation of the endangered species (i) and
- (ii) Harmonizing the rights of tribal people living in and around tiger reserves

30. Ans: (b)

Sol: Keystone species, in ecology, a species that has a disproportionately large effect on the communities in which it occurs. Such species help to maintain local biodiversity within a community either by controlling populations of other species that would otherwise dominate the community or by providing critical resources for a wide range of species.



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31. Ans: (d)

Sol:

- Quantitative Pollutants: These occur in • nature and become pollutant when their concentration reaches beyond a threshold level. E.g. carbon dioxide, nitrogen oxide.
- **Oualitative Pollutants: These do not occur** in nature and are man-made. E.g. fungicides, herbicides, DDT etc.,

32. Ans: (c)

- Sol: Soil pollution can be caused by the following:
 - Microplastics ٠
 - Oil spills •
 - Mining and activities by other heavy industries
 - Accidental spills may happen during • activities, etc.
 - Corrosion of underground storage tanks • (including piping used to transmit the contents)
 - Acid rain .

33. Ans: (a)

Sol:

- Intensive farming •
- Agrochemicals, such as pesticides, herbicides and fertilizers
- Petrochemicals
- Industrial accidents
- Road debris
- Drainage of contaminated surface water into the soil
- Ammunitions, chemical agents, and other agents of war
- Waste disposal
- Oil and fuel dumping
- Nuclear wastes
- Direct discharge of industrial wastes to the soil
 - Discharge of sewage
 - Landfill and illegal dumping •
 - Coal ash
 - Electronic waste

S.No	GAS	GWP (100-year)	LIFETIME(years)
1	Carbon dioxide	1	50-200
2	Methane	21	12
3	Nitrous oxide	310	120
4	Hydro fluoro carbons (HFCs)	140-11,700	1-270
5	Perfluoro carbons (PFCs)	6,500-9,200	800-50,000
6	Sulfur hexafluoride (SF6)	23,900	3,200

34. Ans: (b)

Sol: Photochemical smog, often referred to as summer smog, is the chemical reaction of sunlight, nitrogen oxides and volatile organic compounds in the atmosphere, which leaves airborne particles and groundlevel ozone. Photochemical smog depends on primary pollutants as well as the formation of secondary pollutants. These primary pollutants include nitrogen oxides, particularly nitric oxide (NO) and nitrogen dioxide $(NO_2),$ and volatile organic compounds. The relevant secondary pollutants include peroxylacyl nitrates (PAN), tropospheric ozone, and aldehydes. An important secondary pollutant for

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photochemical smog is ozone, which is formed when hydrocarbons (HC) and nitrogen oxides (NOx) combine in the presence of sunlight.

35. Ans: (b)

Sol: Like other technologies, bioremediation has its limitations. Some contaminants, such as chlorinated organic or high aromatic hydrocarbons, are resistant to microbial attack. They are degraded either slowly or not at all, hence it is not easy to predict the rates of clean-up for a bioremediation exercise.

36. Ans: (b)

Sol:

- Electricity generation in the country is and would remain predominantly coal based in the near future. The Indian coal has high ash content of the order of 30-49 per cent generating large quantity of fly ash at coal/lignite based thermal power stations in the country.
- The management of fly ash has thus been a matter of concern in view of requirement of large area of land for its disposal because of its potential of causing pollution of air and water. To address environmental problem of fly ash disposal, the Ministry issued notification on fly ash untilization in 1999.
- The objectives of the notification are to protect environment, conserve the top soil, and prevent dumping of fly ash from thermal power stations on land and to promote utilization of ash in the manufacture of building materials and construction activity.

37. Ans: (b)

Sol: Nal Sarovar Bird Sanctuary, consisting primarily of lake and ambient marshes, is situated about 64 km to the west of Ahmedabad near Sanand Village, in the Gujarat state of India.

- Mainly inhabited by migratory birds in winter and spring, it is the largest wetland bird sanctuary in Gujarat, and one of the largest in India. It was declared a bird sanctuary in April 1969.
- The late attracts over 210 species of birds in the winter, and harbors a variety of plants and animals. Besides a few mammalian species including the endangered wild ass and the black buck, its migratory bird population includes rosy pelicans, flamingoes, white storks, brahminy ducks and herons. Thousands of migratory waterfowl flock to this sanctuary just after the Indian monsoon season.

38. Ans: (a)

Sol:

- Carbon capture and storage, also known as carbon sequestration, describes the technologies designed to tackle global warming by capturing CO₂ at power stations,
- Industrial sites or even directly from the air and permanently storing it underground.
- It describes long term storage of carbon dioxide or other forms of carbon to either mitigate or defer global warming:
- It has been proposed as a way to slow the atmospheric and marine accumulation of greenhouse gases, which are released by burning fossil fuels

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39. Ans: (b)

Sol: Wetlands are the largest source, emitting CH4 from bacteria that decompose organic materials in the absence of oxygen. Smaller sources include termites, oceans, sediments, volcanoes, and wildfires.

40. Ans: (b)

Sol: About half of the acidity in the atmosphere falls back to earth through dry deposition.

Dry Deposition

In areas where the weather is dry, the acid chemicals may become incorporated into dust or smoke and fall to the ground through dry deposition, sticking to the ground, buildings, vegetation, cars, etc.

Dry deposited gases and particles can be from these surfaces by rainstorms through runoff.

This runoff water makes the resulting more acidic.

About half of the acidity in the atmosphere comes back to earth through dry deposition.

41. Ans: (d)

Sol: It gives an indication of biological damage. It is an estimate of the amount of radiation of any type which produces the same biological injury in man as that resulting from the absorption of a given amount of Xray radiation or gamma radiation.

42. Ans: (c)

Sol: The coal miners are frequently caught by the black lung disease, which is also called as Pneumoconiosis.

43. Ans: (a)

Sol: Reforestation is the restocking of existing forests and woodlands which have been depleted.

44. Ans: (c)

Sol: In aquatic ecosystems oxygen is dissolved in water, where its concentration varies

constantly depending on factors that influence the input and output of oxygen in fresh water the average In water. concentration of dissolved oxygen is 0.0010 per cent (also expressed as 10 parts per million or 10 ppm) by weight, which is 150 times lower than the concentration of oxygen in an equivalent volume of air.

- Oxygen enters the aquatic ecosystem through the air water interface and by the photosynthetic activities of aquatic plants.
- Therefore, the quantity of dissolved oxygen present in an ecosystem depends on the rate at which the aforesaid two processes occur.

45. Ans: (c)

:11:

Sol: Increase or decrease in temperature and salinity causes death of zooxanthalle and thus coral bleaching.

46. Ans: (c)

Sol: Ozone depletion increases chances of skin cancer and cataract due to increase in UV radiation. Increase UV-B radiation increases synthesis of vitamin D.

47. Ans: (b)

Sol: The severity of smog and its period of occurrence during winter season are triggered by a combination of number of factors. These factors include specific emission sources (incomplete combustion, heavy traffic, unique geographical location, and the adverse weather conditions such as temperature inversion. temperature, humidity and the wind speed at ground level. In addition, atmospheric dispersion is another key factor responsible for winter smog and its persistence. The lower the level of atmospheric dispersion, the higher the level of winter smog.



48. Ans: (a)

Sol: Pollutants are any harmful contaminants in the air; therefore, indoor air pollution is when pollutants from things such as gases and particles contaminate the air indoors. Indoor air pollution is a very real and dangerous thing because indoor air is far more concentrated with pollutants than outdoor air.

49. Ans: (a)

Sol: Soot, also called black carbon (BC), contributes to climate warming in two ways. First, black soot particles in the air absorb sunlight and directly heat the surrounding air. Second, soot falling on snow or ice changes those reflecting surfaces into absorbing ones, that is, soot decreases the albedo. Therefore, soot deposits increase the melting rate of snow and ice, including glaciers and the arctic ice.

50. Ans: (a)