**Indraprastha Institute of Information Technology**

**End- Semester Examination**

**ESC 207 A Evolution Ecology and Environment**

**( 10/05/2024)**

**MM 30 Time 2 hrs.**

**Attempt all the questions**

**Marks are 2+1 for a and b parts respectively for all questions**

1.(a). Describe what are the adverse effects of population growth on the environment and what may happen if growth of population continues at the present pace ?

(b).Describe the formula for measuring the population growth. ( 2

1(a) Population was 1000 million in 1804.

And then India,s population in 1947 was 340 million.

Human population growth impacts the Earth system in a variety of ways, including: Increasing the extraction of resources from the environment. These resources include fossil fuels (oil, gas, and coal), minerals, trees, water, and wildlife, especially in the oceans.

These include pressure on land, land/soil degradation, forests, habitat destruction and loss of biodiversity, changing consumption pattern, rising demand for energy, air pollution, global warming and climate change and water scarcity and water pollution.

(b). The growth rate is computed using the exponential growth formula: r = ln(pn/p0)/n, where r is the exponential rate of growth, ln() is the natural logarithm, pn is the end period population, p0 is the beginning period population, and n is the number of years in between.

2(a ) What are the framework forms of panarchy ?

(b) What is ontogenetic niche shift i.e., ONS ?

(a). This framework forms a panarchy and exhibits non-linear behaviors. This means that effect and cause are disproportionate, so that small changes to critical variables, such as the number of nitrogen fixers, can lead to disproportionate, perhaps irreversible, changes in the system properties.

(b) Ontogenetic niche shift (abbreviated ONS) is an ecological phenomenon where an organism (usually an animal) changes its diet or habitat during its ontogeny (development). During the ontogenetic niche shifting an ecological niche of an individual changes its breadth and position.

**Commonly fish undergo ontogenetic habitat shifts, i.e. they change habitat over their life span as they grow in size. Commonly, habitats for spawning and juvenile growth often differs from the habitat used by adults for growth.**

3. (a).Why are Beavers called ecosystem engineers?

(b). Describe the process and concepts of ecosystem engineering .

(a). Beavers are ecosystem engineers because they create, modify, and maintain habitat and ecosystems. They consequently have a large impact on the biodiversity of an area. They bring wood into the water, and that wood provides food and shelter for insects. Those insects become food for other species, including salmon.

The process and concept of ecosystem engineering are related to niche construction, but the former relates only to the physical modifications of the habitat whereas the latter also considers the evolutionary implications of physical changes to the environment and the feedback this causes on the process of natural selection.

4. (a).What are microbiomes?

(b). What are the effects of drop in the Environment Quallity Index up to almost 480-500 in New Delhi on human in general.

(a).To a microbe, the human body is a habitat and a landscape. Microbiomes were discovered largely through advances in molecular genetics, which have revealed a hidden richness of microbial diversity on the planet. The oceanic microbiome plays a significant role in the ecological biogeochemistry of the planet's oceans.

(b). Uptick in respiratory, and cardiac problems due to poor air quality in city. Poor air quality in the capital has led to a rise in respiratory and cardiac issues among residents. Cases of asthma, bronchitis, cardiac arrest, stroke, and gastric problems have increased.

Smoking almost more than 5-6 cigarettes in a day and reduction of life span by almost 5 years as per some experts.

5. (a). What is the difference between immigration and emigration of populations?

(b). Why is carrying of some plants from one country to another is restricted or banned?

(a). Immigration means the act of coming to your own country or place of residenc/sitee. Emigration means the act of leaving your own country or place of residence/site. Immigration can be said as in-migration which means a person who has moved to a separate country. Emigration is moving out of one's own country and settling there permanently.

(b). Plants and trees are essential to our ecosystem and can carry various pests and diseases that can be harmful to the environment and agriculture of the destination country. - Seeds can potentially become invasive species and disrupt the local ecological balance.

6. (a). Describe the 4 broad categories of ecosystems based on the type of environment where the population live.

(b). What are the manmade ecosystems, give an example ?

(a).Ecosystems are broadly categorized as terrestrial, freshwater, atmospheric, or marine. Differences stem from the nature of the unique physical environments that shapes the biodiversity within each.

(b). The man made ecosystems include the villages, towns, cities, rivers, orchids, dams, gardens, lakes, crop field, aquarium and agriculture.

7. (a). What is omnivory?

(b).Give examples of omnivores.

(a). An omnivore is a kind of animal that eats either other animals or plants. Some omnivores will hunt and eat their food, like carnivores, eating herbivores Omnivory affords wider choice for food, however omnivores are not so good in predation. They either heat left over meat/dead flesh or make good with vegetarian food/ like herbivores.. Their place in woodweb is also complicated.

(b). Examples of omnivores include : Examples of omnivores include bears, birds, dogs, raccoons, foxes, certain insects, and even humans. Animals that hunt other animals are known as predators, while those that are hunted are known as prey. Since omnivores hunt and are hunted, they can be both predators and prey.

8. (a).What is the difference between Ex-situ and In-situ conservation.

(b). Give examples.

(a). The process of protecting an endangered plant or animal species in its natural habitat is commonly known as in situ conservation. On the other hand, ex situ conservation is the relocation of endangered or rare species from their natural habitats to protected areas equipped for their protection and preservation.

(b). In-situ conservation :

The unique biological communities are protected in the wild population The endangered species are particularly conserved.

Example: Wildlife sanctuaries, biosphere reserves, national parks, etc.

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Ex-situ conservation

It is the methods of conserving all the living species in the artful habitats that reflect their natural living habitats.

Examples of ex-situ conservation of biodiversity include aquariums, botanical gardens, cryopreservation, DNA banks, zoos, etc.

9. (a). Give examples of household hazardous chemicals

(b). What is Basel convention?

(a). Pesticides. Automotive products (like antifreeze or motor oil) Miscellaneous items (like batteries, mercury thermometers and florescent light bulbs) Flammable products (like kerosene, home heating oil, propane tanks and lighter fluid), used medicines etc.

(b). The Basel Convention covers hazardous wastes that are explosive, flammable, poisonous, infectious, corrosive, toxic, or ecotoxic. The categories of wastes and the hazardous characteristics are set out in Annexes I to III of the Convention.

10. (a). If the utilities generate electricity using 33 % efficient coal fired power plant. As a carbon reducing measure if electric water heater that converts heat into electricity at 100 % efficiency are replaced with a gas water heaters with a 70 % conversion efficiency. By what fraction the ( and percentage) carbon emission would be reduced.

Emission factor for coal is 25.2 x 106  ton. C/ quad.

Emission factor for gas is 14.5 x106 ton C/quad.

You may Assume 1 quad of electricity is being delivered to electric heaters.

(a). Emissions from coal burning = 3 X 25.2 X 106 tons carbon/quad. 75.6 X 106 ton carbon..

Heat input by using gas = 1 quad / 0.70 = 1.42 quad.

Emission from gas burning = 1.42X14.5 X 106 ton carbon/quad

= 20.59 \* 106 ton carbon.

Reduction = 75.6 - 20.59 = 55.01 which is 72.7 % Reduction in carbon Emissions by using gas instead of coal..

(b). Estimate the tons of carbon in the atmosphere corresponding to a concentration of 390 ppm of CO2. Assume the total mass of air equals 5.1 x 1018 kg. The density of air at the standard temperature and pressure ( STP, 0 O C and 1 atm. ) is 1.29 kg/m3.

Solution ( TO BE CALCULATED AS PER THE FORMULA PLEASE)

CO2 = (390/1x106 ) X (44/22.4) X 1000 =

PLEASE FOLLOW THE FORMULA AND CALCULATE AS GIVEN IN THE SLIDE BY REPLACING THE VALUE OF CO2 CONCENTRATION AS 390 PPM.

Carbon = ( 0.746X 12X 5.1X1018 ) / (44X1.29 ) = (45.65/ 56.76 ) X 1018 =

0.804 X 10 18 g = 804 X 10 17 g OK up to this.

Other Answers could also be :

= 804 X 10 9  tons . OK

= 804 giga tons. OK