MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
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II SEMESTER B.TECH. MIDTERM EXAMINATIONS MARCH 2024

DEPARTMENT OF CIVIL ENGINEERING

SUBJECT: ENVIRONMENTAL STUDIES [CIE 1072]

Date of Exam: 19/03/2024 Time: 02:45 PM-04:45 PM MAX. MARKS: 30

SCHEME OF EVALUATION

Q1. A taxon survives only in captivity, cultivation and/or as naturalized population outside its native range, as presumed after exhaustive surveys (0.5)

1. Critically endangered
2. Vulnerable
3. **Extinct in the wild
4. Endangered

Q2. Climate change affecting the timing on which many animals rely on to maximize their productivity is known as (0.5)

1. Window of vitality
2. **Temporal trophic mismatch
3. Ecological niche
4. None of the above

Q3. Which of the following is an incorrect statement? (0.5)

1. Nutrient cycling is represented through biogeochemical cycles.
2. **An energy pyramid can be inverted for a healthy closed ecosystem.
3. The energy transmission is represented through food chains.
4. The least amount of biomass is found at the top of the Ecological pyramid.

Q4. Remove the odd one out of the following which represents niche partitioning of coexisting warblers: (0.5)

1. Cape May.
2. Yellow rumped.
3. Black burnian.
4. **Waders.

Q5. The plastic debris size ranging between 5mm and 2.5 cm in its length is called as (0.5)

1. Microplastics.
2. **Mesoplastics.
3. Macroplastics.
4. Megaplastics

Q6. Which of the following statement is true? (0.5)

1. Total estimated quantity of CO2 increase in the atmosphere is the same as the amount emitted in the atmosphere by fossil fuels.
2. Ice cores cannot give a temporal scale of atmospheric composition
3. **Carbon dioxide can alter the pH of surface ocean water
4. GDP is not a measure of natural resources consumed

Q7. Ecological deficit can occur under which of the following scenario? (0.5)

1. Biocapacity is in surplus compared to ecological footprint
2. Nation starts exporting biocapacity through trade
3. **Liquidation of national ecological assets
4. None of the above

Q8. Which of the following is not controlling factor on soil formation? (0.5)

1. Climate
2. Time
3. Plants and animals
4. **Crop rotation

Q9. Which of the following technique watershed management include conversion of slopes into level step fields? (0.5)

1. Contour stone walls
2. Contour trenching
3. Farm bunds
4. **Bench terraces

Q10. Which of the following statement is true? (0.5)

1. Sustainable growth is equivalent to environmental sustainability
2. **Environmental Kuznets curve is applicable for countries in isolation
3. GDP growth will always keep inequality in rise
4. None of the above

DESCRIPTIVE QUESTIONS

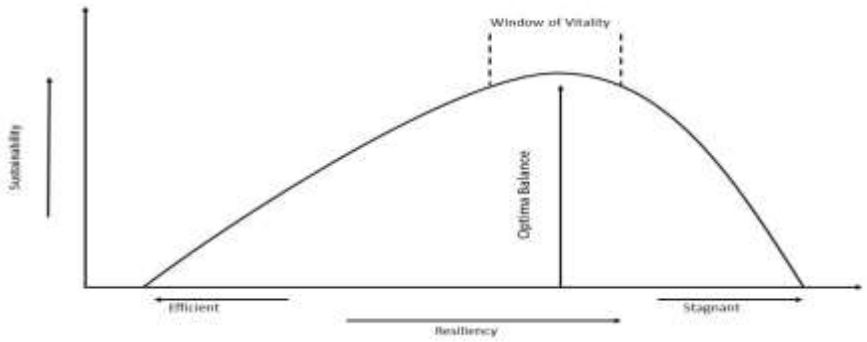
Q11. With the help of a neat sketch explain the health of the Ecosystem through the perception of complex systems. (4)

Ans

Graph- 1mark, Explanation- 3mark

A complex system is defined as a system that is composed of many components which interact with each other in often unexpectable ways and in a non-linear fashion to show emergent behavior (unexpected behavior) and spontaneous order (they show some unexpected pattern in otherwise what looks like chaos). These factors make such systems very difficult to model or simulate on a computer. Ecosystems are a classic example of a complex system where each component in the system is the biodiversity it hosts.

When a complex system has few components, it is known as a “efficient system” as it can transmit anything through it with very little loss. But it is also very susceptible to collapse if a few components fail and hence have very low sustainability. On the flipside, if the system has too many components, it becomes a “stagnant system” as there is a lot of loss from whatever it is that you are trying to transmit through the system and hence again have very low sustainability. But they are very resilient to changes as they can withstand failure of many components in them.



As research has shown in the graph above, most stable ecosystems occupy a space called the “window of vitality” where they have just the right amount of biodiversity that allows them good sustainability and also resiliency. Any changes to the biodiversity to the ecosystem can push it away from this window of vitality and accelerate their demise.

Q12.Discuss on the challenges to deal with tragedy of commons and suggest viable solution. (4)

Ans:

There is also no technology that can definitively solve the tragedy of commons problem. This is an environmental issue with no definite solution and in many cases, no solution at all. For **example** Ground water is a tragedy of the commons issue because underground water is a commons property. Individuals extract water from their borewells but the underground aquifer is common to all. If one extracts heavily, it affects the supply of others. **It is difficult for government** to reinforce a single policy for each such commons (they can be quiet far apart and isolated from populated areas. They can also be very different from one another). Also **tackling the power disparity** in each commons (one of the farmers can be much richer than the others, or could be of a higher or more influential caste) which can affect how policing works (they can influence the policing mechanisms through bribes or other such mechanisms)

Similarly, the **private owner may not be considerate** of all necessities of all the farmers as his/her profits might be less. They may not stay neutral to the power/influence imbalance in that locality. This is a type of problem which, in many cases, cannot be solved-only managed.

Q13. Explain with a case study the sharp decrease of the water levels in the Puzhal reservoir and its consequences. (3)

Ans:

Sharp decrease in the water level in the Puzhal Reservoir, the largest reservoir in Chennai over the summer months between 2018-2019 was a consequence of the bad urban planning, over extraction of ground water and drought.

Encroachment of wetlands has caused serious water shortage issue. Since the wetlands are not connected or are encroached on, they don't receive sufficient water to ensure that they have water during the summer months. As a consequence, the city has had to rely on ground water in the summer for its supply which has also started to dry (again, due to poor surface water circulation and storage). Furthermore, since Chennai is on the coast, the drained aquifers are intruded by sea water, increasing the salinity of the land above them (and of the aquifers themselves, of course), destroying the agriculture of the region. This has led to increased burden on the already in-debt farmers leading to a sharp rise in farmer suicides.

Q14. Discuss on the plastic waste generation in India and the steps taken to curb the same (3)

Ans:

As per the 2015 study conducted by Central Pollution Control Board (CPCB) in 60 major cities of India: 4,059 tonnes per day of plastic waste was generated by these cities. An estimated 25,940 tonnes per day of plastic waste is generated in India. Out of the plastic waste generated, 94% comprises of thermoplastic content which is recyclable.

Indian Government has banned on use of single use plastic items from July 1 2022.In order to deal with the menace of huge uncollected waste across the country, the Centre has also banned Manufacture, import, stocking, distribution, sale and use of all single-use plastic commodities having thickness less than 120 microns from December 2022. Plastic polymers can be used and acts as a bitumen binder which can be used in laying roads. A study by the Central Pollution Control Board (CPCB) in 2008 claimed that such roads are performing much better than regular bitumen roads under similar conditions, with better resistance toward rain, increase in strength by 100 percent, and no development of potholes in the years monitored.

Q15.Explain the necessity of rainwater harvesting. (3)

Ans

Conscious collection and storage of rainwater to cater to demands of water, for drinking, domestic purpose & irrigation is termed as Rainwater Harvesting. It is necessary due to following scenario.

- To arrest ground water, decline and augment ground water table
- To beneficiate water quality in aquifers
- To conserve surface water runoff during monsoon
- To reduce soil erosion
- To inculcate a culture of water conservation

Q16.Explain the social and environmental externalities of mining sector. (3)

Ans

Mineral resource sector has played a vital role in the world economy and human development from time immemorial. For example, in the case of India, much of the country's natural resources are located in forest-covered areas raises further environmental and socio-economic concerns. As fastest-growing economies of the world, there is increased pressure for metals/minerals to meet the demands of growth in GDP.

Despite longstanding institutions for environmental protection, regulatory violations, poor implementation of environment and community rights, over-extraction, and illegal mining continue to anguish the sector. Regulations mandate socio-economic rehabilitation and environmental restoration of mined-out areas, especially post-closure of mines. Yet, there is a lack of evidence on the implementation of the same. Although mining has brought about economic development in the mineral-rich states of Odisha, Goa, Karnataka and Jharkhand, it has also caused significant environmental damages and negatively impacted communities in project areas. In some cases, mining operations have been carried out without regard for the 'carrying capacity' of the environment and other infrastructural limitations. This has put avoidable pressure on the environment and caused inconveniences to the people living in the mining areas. Illegal mining in many cases has similar effect while additionally causing loss of public revenues.

Q17.List the long-term consequences of green revolution in India. (3)

Ans

Long term consequences of green revolution include

- Heavy pesticide and fertilize use coupled with resource intense crops have deteriorated the micronutrient content of soil in Punjab.
- Heavy dependence on irrigation from borewells coupled with weak monsoons has severely depleted the underground aquifers, forcing the farmers to dig deeper borewells than ever before. Unfortunately, deeper borewell waters are also more saline and cause damage to crop roots and the soil, further decreasing their productivity.
- Heavy pesticide and fertilizer use have had some serious health consequences for the farmers and intensification of irrigation and machine farming has increased their debt causing a sharp rise in drug use and their suicide rates.

Q18.List the reasons for decrease in effectiveness of wetlands in Chennai. (2)

Ans:

Chennai, based on its geography and geology, has historically been characterized as a flood plain where a set of interconnected wetlands and natural water channels store and drain the surcharge during its two monsoonal seasons (the south-west monsoons and the north-east monsoons) from what is essentially a flat land.

Since, the lakes which would have otherwise help absorb the excess flow and their network was encroached on, and the urbanization stopped the flow of water where it should not have stopped, the effect of the heavy rains was amplified creating flood. It is also dependent on many of these wetlands for protection against cyclones, to which the entire Indian Eastern coastline is particularly vulnerable to.

City has seen an unsustainable and unscientific urbanization which in numerous cases has led to loss of green cover and encroachment of waterbodies. This has also prevented replenishment of wetlands naturally and in due course of time they became dry.