



Roll No:

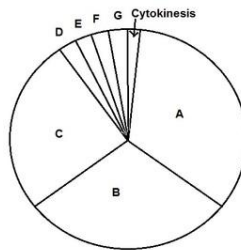
Total printed pages : 08  
Total printed questions : 26

**General Instructions:**

- The question paper comprises of five Sections A, B, C, D and E.
- All questions are compulsory.
- There is no overall choice however; internal choice has been provided in one question of 2 marks, one question of 3 marks and all the two questions of five marks category. Only one option in such question is to be attempted.
- Questions 1 to 5 in section A are very short questions of one mark each. These are to be answered in one word or one sentence each.
- Questions 6 to 9 in section B are short questions of two marks each. These are to be answered in approximately 20 - 30 words each.
- Questions 10 to 20 in section C are questions of three marks each. These are to be answered in approximately 30 - 50 words each. Question no. 21 is of 4 marks.
- Questions 22 and 23 in section D are questions of five marks each. These are to be answered in approximately 80 - 120 words each.
- Questions 24 to 26 in section E is based on OTBA of 10 marks. Answer them in 100 - 120 words each.

**SECTION – A**

- What are adventitious roots? Give examples.
- What will happen to the water potential of a solution when solute is added?
- What is known as Serum?
- What is Hydroponics? Give the application of this technique.
- Identify this diagram and replace the letters with adequate words.



**SECTION – B**

- What is Photoperiodism? Explain the different categories of plants on the basis of Photoperiodism giving one example of each category.
- Differentiate between Transpiration and Guttation.
- Why bile juice contains no enzyme yet it is important for digestion?
  - Why are enzymes secreted in inactivated form in human digestive system?
- Explain the digestive activity of the following:- (ANY FOUR)
 

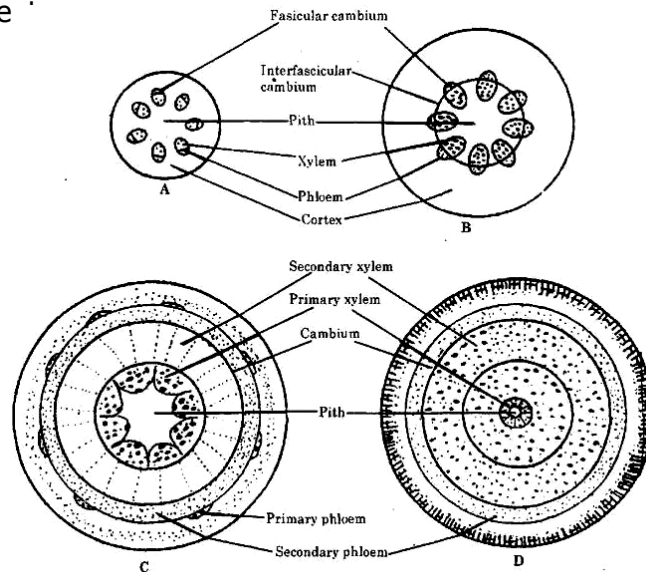
i) Salivary Amylase	ii) Pepsin	iii) Trypsin
iv) Lipase	v) Maltase	vi) Lactase

**SECTION – C**

- Enumerate the key events of Telophase stage of Mitosis.  
Draw the diagrams and compare cytokinesis of plant cell with animal cell.
- What are growth regulators and growth retarders?  
Explain the role of any two growth regulators and one growth retarder.
- What is called as double circulation?
  - What is Erythroblastosis foetalis?
- Identify and label the given diagram.
  - Terrestrial animals are generally either ureotelic or uricotelic, not ammonotelic, why ?



14. Explain the following event



15. Enumerate the chemical events that occur in the process of blood clotting.

(OR)

How do various structures of human respiratory system regulate the passage of air in and out of our body?

16. What are the three types of Simple Epithelium? Explain using the following:-

i) Location in the body      ii) Structure      iii) Diagrams

17. Differentiate between the following:-

a) Heart Wood and Sap wood      b) Prop root and Stilt root  
c) Bone and Cartilage

18. Draw a graph to explain the role of activation energy during enzymatic reaction.

19. Write the correct scientific term at the end of the each statement:-

i) The process in which cells lose water in a hypertonic solution \_\_\_\_\_.  
ii) The phenomenon of adsorption of water by the solid surface of a substance without forming a solution \_\_\_\_\_.  
iii) It is the osmotic pressure within the cells of a root system that causes sap to rise through a plant stem to the leaves \_\_\_\_\_.  
iv) The force exerted due to loss of water from the leaves which allows continuous movement of water in plants \_\_\_\_\_.  
v) The extracellular mode of transport of water in plants \_\_\_\_\_.  
vi) The movement of water molecules down their concentration gradient across a semipermeable membrane \_\_\_\_\_.

20. What do you understand by the following:-

a) Metacentric Chromosome      b) Thylakoid and Grana  
c) Power House of the cell.

21. Anand a 14 years old boy thinks smoking makes him more energetic and feel like adult and thus more responsible citizen. He tries to smoke when he is with his peer group. His friend Rohit advised him the ill effect of smoking and later Anand quit the smoking.

a) What values do you find in Rohit?  
b) What is the main cause of smoking addiction in young children?  
c) What are the ill effects of smoking?

#### SECTION - D

22. Display a table indicating the major human endocrine glands including their hormones and functions.

(OR)

How does a nerve impulse conduct through the following structures:-

a) Across a non – myelinated nerve fibre.  
b) Across a synapse.

Explain and make necessary diagrams.

23. Compare cyclic and non-cyclic photophosphorylation. Explain and draw the cycles.

(OR)

Explain the details of Glycolysis. Present schematic diagram and describe each step.

**SECTION - E** (Open Text Material)*1. Theme - Quantifying Evidences of Sensitivity*

Abstract:

*Shifting the focus from guilt and indignation generated because of deteriorating / degrading environmental quality and gearing to quantify the evidences of successful restorative efforts, positively influences the intensity of encouragement and motivation which gets reflected in the act of enactment.*

Mother Nature is beautiful and bountiful. It has provided us with all possible means of sustenance and a happy and fulfilled life. It has taken care of our need for food and fresh clean water, life sustaining oxygen and beautiful companions in the form of birds, butterflies, flowers and trees.

Since ages man has lived in harmony with Mother Nature deriving benefits from its bounty and being protected from all kinds of harm. Along with it, the huge biodiversity on the earth is important for humans through ecosystem services and goods. Ecosystem services are - regulatory such as air and water purification, provisioning (goods), such as fuel and food and cultural and supporting such as pollination and nutrient cycling.

However, with the advent of the industrial revolution in about 1760 to sometime between 1820 and 1840, began an era when man broke the umbilical cord with Mother Nature and went on a path of rampant plunder of nature's beauty and bounty. Setting up of factories and mass production led to degradation of certain natural resources, leaving our environment permanently/sustainably damaged. One example of this depletion was deforestation. When the trees were cleared, the wildlife in the forest also became uprooted.

Scarcity of trees compounded the problem of carbon emissions. Forests help to emit oxygen and balance its percentage in the air, whereas factories emit poisonous emissions and eliminate the source of oxygen. The pollution that has resulted from factories involved not only in airborne emissions but in land and water pollution also and shifted the world from green house effect to global warming and climate change.



Non - sympathetic deforestation is being continued at an alarming rate since early 1950s. Almost half of the original forest habitat has been cut down. The removal of trees without replenishing with sufficient reforestation has resulted in serious damage to habitats, biodiversity and led to aridity. It has unfavorable impacts on atmospheric carbondioxide levels and has permanently destroyed the habitats of thousands of plant and animal species.

Insects like cockroaches are said to be able to survive even in a nuclear holocaust. Do you think that insects may one day replace mammals as the dominant species due to global warming and habitat loss!!!

In the rain forests and the Himalayas, for instance, many species that had yet to be discovered have been destroyed forever due to bizarre destruction of their habitats, fragmentation of the habitats and killing and poaching.

Mass extinctions have taken place on the earth earlier too and new species took the place of older ones, for example, mammals took over reptiles or angiosperms replaced ferns. However, this time unlike the mass extinction events of geographical history, current extinction challenge is one for which a single species - ours- is almost wholly responsible and will also bear the maximum brunt.

If there are 100,000,000 species on the planet and the extinction rate is just 0.01% per year, at least 10,000 species go extinct ever year.

If the approximate number of species is 1.9 million, given the present rate of extinction, how long would it be before we lose all the species in the world???

Although, it is we the humans who are almost wholly responsible for the mass extinction episode, it is our species only that is taking the maximum steps to alleviate the situation.

Thus a large number of restoration drives have taken place and are still on to restore the Earth's ecosystem to its old pristine form.

One of the best examples of ecosystem restoration can be seen in the form of Aravalli Biodiversity Park. Once a dense forest, Bhatti-Asola area on Delhi-Haryana border was ravaged by mining.

Now the area is gradually trying to come back to life due to continuous and combined efforts along with the coming back of peacocks, birds, reptiles, amphibians and other wild live stock, that were on the verge of getting extinct from the area in the upshot of large-scale mining. Approximately 5,566 acres of land in the Aravalli range of Delhi-Haryana border has been cultivated. Breeding of reptiles has also increased along with which the area is becoming a habitat for some of the most venomous snakes and lizards, avians and amphibians. A leopard was also reported to have been spotted some time back.

13 old ponds have been converted into relatively bigger water bodies by increasing the area and about 95 percent of the land has been covered with vegetation. This has happened because the government declared the area as a wildlife sanctuary and steps were taken to rehabilitate it.



*These water bodies in the area were once reduced to arid patches by continual mining, now the water bodies are healthy again*



The swathes were once dense forests but were ravaged by quarrying, they are green once again. On the same lines, restoration of the coral reefs is also taken up at war footing by countries including India that have a marine ecosystem and coral reefs. Coral reefs are extremely complex marine ecosystems which provide habitat to numerous aquatic species. Coral reefs are considered to be the most biologically diverse and productive ecosystems on the earth. They occupy approximately 0.2% of the world's ocean surfaces.

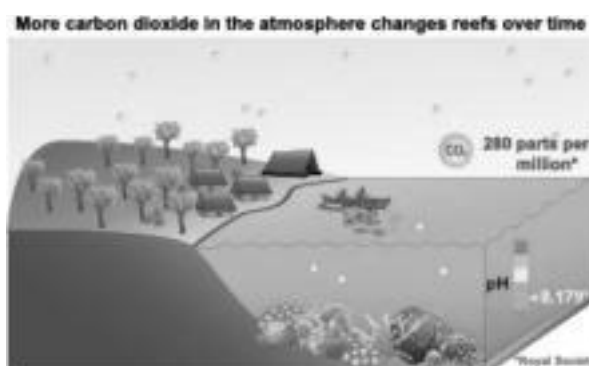


How are corals made? What use are they put to? Can they be significant enough to affect the global eco-system? However, coral reefs around the world are declining due to human-caused changes in water quality which increases water temperature, and adversely affect the nutrients, as well as from direct physical damage from being hit by massive ships and boats, anchoring, destructive fishing techniques, and other intensifying human stresses.

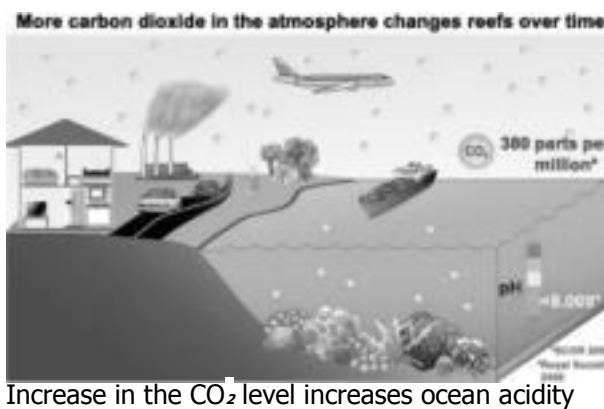
If water temperature stays higher than usual for many weeks, the zooxanthellae, on which corals are dependent for food, leave their tissue. In absence of zooxanthellae, corals turn white because zooxanthellae give corals their colour. White, unhealthy corals are called bleached which are weak and less able to combat diseases.

Besides increase in temperature, ocean acidification affects other living beings too, for example, in snails, clams, and urchins; the process of making of calcium carbonate shells by absorption of calcium is being hindered.

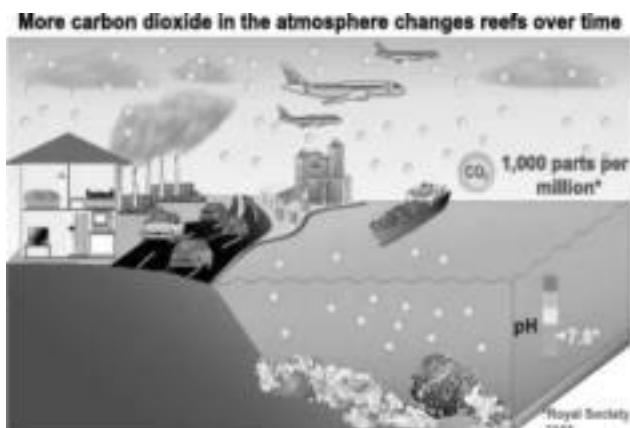
The following set of pictures show a progressive increase in the level of atmospheric CO<sub>2</sub> has affected the acidity of the ocean and consequently the Coral Reefs:



Normal level of CO<sub>2</sub> maintains the acidity level of the oceans



Increase in the CO<sub>2</sub> level increases ocean acidity



Excess of CO<sub>2</sub> in the atmosphere causes ocean water to become too acidic for the survival of corals

Which group/s of organisms do snails, clams, slugs and sea urchins belong to?

How does an increase in the atmospheric level of CO<sub>2</sub> change the acidity of the ocean?

Damage to coral reefs is causing severe declines in catches, stocks, sizes, and diversity of fish and other marine animals, and it also causes erosion of beaches and coastal structures, and loss of tourism revenues. To address these issues, innovative techniques like underwater coral farming and reattachment of broken coral pieces are being used. The emphasis is on preventive aspects as the restoration work is both costly and time consuming.

The Ministry of Environment in India has established a National Coral Reef Research Centre at Port Blair. It is a two-tier system at National and State level which is in operation for efficient coordination to implement the Scheme on Mangroves and Coral Reefs. The Ministry's task is to provide financial assistance to the State Forest Departments of all identified coral reef areas for activities like monitoring, surveillance, education and awareness. Research and development activities are also being supported with emphasis on targeted research on coral biodiversity and its management, including various aspects of pollution in these areas.

*(Source: Data from Ministry of Environment & Forest)*

When prevention was found to be not enough, active redressal of the damaged coral reefs was done. In U.S, special request was made to the trained scuba divers to work on the reefs. These divers transplanted the pieces of coral by using cement or epoxy putty. The goal was to restore/repair coral reefs to allow the natural inhabitants a chance to thrive. Scientists have found that the corals, which are grown in the nurseries, are able to reproduce in their new homes. It means genetic diversity can be achieved along the reefs by allowing for stronger and more resilient ecosystems in our oceans.

In August 2002, the 36-feet long boat *Lagniappe II* (a huge ship) ran aground on a shallow coral reef near Key West, Florida and injured approximately 376 square-feet of living corals coming under the sanctuary. After assessment of damage to the reef by sanctuary staff, restoration biologists discovered and used special cement that hardens under water to reattach approximately 473 corals and their fragments that had been toppled or dislodged during the grounding. The sanctuary was tracked for coral condition at the restoration site over an eight-year period, began in 2002. By 2009, the reattached coral fragments were undistinguishable from the adjacent undamaged coral colonies. Surprisingly after a year, the population of corals at the restoration site was higher than at the reference site.



Underwater coral farm



Repairing of the coral using cement and epoxy

Similar to the coral reefs, are the Mangrove forests of India. Mangroves are salt-tolerant forest ecosystems of tropical and subtropical intertidal regions and are abundant along the coasts of the Indian subcontinent. Like terrestrial tropical forests, mangroves have been a significant part of the Indian economy for thousands of years and are a reservoir of valuable natural resources.

They are multiple use ecosystems and play a role in mitigating the impact of natural disasters such as cyclone, storm surges and tsunami in coastal zones. They provide livelihood to millions of fishers and act as critical habitat for wildlife. However, not all coastal areas are suitable for mangrove plantation as mangrove requires an appropriate mix of saline and freshwater, and soft substrate like mudflats to be able to grow and perpetuate.

Thirty eight mangrove areas have been identified in India for intensive conservation and management. The Coastal Regulation Zone Notification, 2011, recognizes the mangrove areas as ecologically sensitive which implies that these areas are accorded protection of the highest order.

FSI (Forest Survey of India) has been assessing the mangrove cover using remote sensing since 1987. The recent assessment shows that the mangrove cover is 4,662.56 km<sup>2</sup> or 0.14% of total geographical area. The very dense mangrove comprises 1,403 km<sup>2</sup> (30.10%) and moderately dense mangrove 1,658.12 km<sup>2</sup> (35.57%), with open mangroves 1,600.44 km<sup>2</sup> (34.33%).

Compared with 2009 assessment, there has been a net increase of 23.34 km<sup>2</sup> in India's mangrove cover, attributable to increased plantations, particularly in Gujarat, and regeneration of natural mangrove areas.

(Source: Ministry of Environment & Forests Government of India, Brief Statement on Activities and Achievements 2013)



*Germinating red mangrove*



*Pneumatophores*

The indiscriminate use of the coastal wetlands causes loss of nutrients, soil erosion, and decreasing fishery potential, which in turn has led to many ecological and economic problems along the coast.

For Example, the Mahim Creek, a coastal wetland in Mumbai, considered a heavily polluted area, is under several developmental pressures including railroad lines, water pipes, bridges, industries and slums. Water, heavily contaminated with toxic industrial waste, cannot support animal life. In order to alleviate the situation for this heavily polluted area, the Mumbai Municipal Corporation and the World Wide Fund for Nature (Mumbai) jointly agreed to rehabilitate this area as a mangrove park for habitation by diverse bird fauna. Setting up of a mangrove nursery led to mangrove afforestation in the Mahim Nature Park (MNP) possible.

Today, the Mahim Creek supports a flourishing evergreen mangrove forest. This vegetation and the surrounding areas are favourite roosting spots for aquatic and migratory birds that spend winter in the Indian subcontinent. That is why the Mahim Nature Park has become a popular spot for birdwatchers from mid October to February-March. Though the water of Mithi river is polluted, but Mahim Nature Park and surrounding mangroves provide resting spots for thousands of birds.



*Restoration of Mahim Creek*



*The replantation of mangroves and development of the forest*

The common house sparrow - *Passer domesticus* is one of the most ubiquitous birds in our surroundings and is one of the most familiar winged companions of humans. It has, during the course of evolution, evolved with us. It is the most familiar bird to us. Its chirping still awakes the people in the villages. Since we share the same habitat, it becomes our moral responsibility to save them.

This bird was continuously on the decline over its large natural range, both in the rural and urban habitats. The decline in the number of the house sparrow was a signal of continuous degradation of the environment. March 20 is being celebrated as World Sparrow Day. The purpose behind it is not only to organize events on that day but to use it as a tool for spreading awareness among the masses about the need of the hour to protect urban biodiversity. The celebration aims at bringing together the various strata of individuals to work for the cause. It also aims at awakening scientific community and government to take its notice and implement the idea of protection and reform policies for it. Scientists observed it in 1990s and since then surveys are being conducted to know the cause of decline in their number and advertisements, campaigns and outreach and awareness programmes are being conducted to combat the situation. The celebrations are worldwide in form of activities to protect it. Citizen Sparrow is an ongoing programme on the same lines, in India, to seek the contribution of every individual in knowing the actual and timely status of every corner of the country and a link is given where the information can be uploaded. This can be done at personal and community level wherein school children can also participate in shouldering the responsibility of being global citizen.

There are the observations and reports of expert ornithologists in journals such as Indian Birds and also on the website of Common Bird Monitoring of India (CBMI), a Citizen Science Programme of Nature Forever Society. Many organizations and individuals are part of the programme. The programme was intended to collect data on common Indian birds. Though the monitoring exercise was not as long-standing as that of CBMI, a survey done between April and July, 2012 by Citizen Sparrow has been an intense exercise in monitoring the concerned species, with 10,666 records, from 5655 participants across 8425 locations in India. This was a big initiative involving every citizen possible; the oldest participant was 91, and the youngest, 7. The findings did indicate a fall in the number of House Sparrows. There are some more anecdotes which make us aware about the individual and communal steps taken in this direction. Students from Women's College, Patna, scattered millets for sparrows. In 2012, sparrow was declared as the state bird of Delhi and it was said that the idea behind it is to protect it. The Nature Forever Society with the Burhani Foundation (India) started a campaign named 'SOS' = Save Our Sparrow, in which they distributed 52,000 bird feeders around the world on a non-profit basis. The Postal Department of India has also contributed in spreading awareness as it released a stamp of the house sparrow on March 20, 2010.

Youth of Purunabandha village of Ganjam district got attracted towards the issue and they took up conservation attempts as their hobby. The combined and dedicated efforts started showing the results as the team started with 11 sparrows around them and reached to 50 within a year. This team has inspired the youth of surrounding villages too to find causes of vanishing of other birds including sparrows from the periphery and to root them out.

India has one more property along with many others - the big cats. Country has half of the world's tiger population. Recently tiger census report has been released on 28<sup>th</sup> March, 2011, according to which there are 1,706 tigers in the country, ranging from 1,571 to 1,875. This report was released by National Tiger Conservation Authority.



According to Tiger Census report 2008, there were 1411 tigers in all 17 tiger states of the country, classified into 6 landscapes; Central Indian Landscape Complex, Eastern Ghats, North Eastern Hills, Western Ghats, Shivalik - Gangetic plains and Sunderbans. It was threatening to know from various sources of information that 923 tigers were killed from 1994 to 2010 and it was further sad to know that this figure includes only reported cases which may be a fraction of real data. Many of the tiger population, particularly those outside protected reserves, are fragmented and suffer from intense poaching pressure, a dwindling prey base and plenty of over-used habitats.

In spite of all these problems, India holds better chances of tigers' survival and conservation with overall 17 tiger states and 7 states with tiger population more than 100. There are many dedicated organizations in India working for it on a national level and trying to increase political will to secure the future of tigers. Strategy for tiger conservation by NTCA and WPA 1972 included the setting up of 66 national parks and 421 wildlife sanctuaries. Later on the number was increased to 102 and 515 and further 44 conservation reserves and 4 community reserves were set up. A ban had put up on poaching and tiger trade. These efforts resulted in increase in the tiger density. Training, support and better law enforcement were the key points of protection measures. Loss of vital habitats due to urbanization, building of dams has been observed seriously and reduced a lot.

From June, 2010 to July, 2011 the National Tiger Conservation Authority (NTCA) in collaboration with the Wildlife Institute of India (WII) undertook a self-regulating Management Effectiveness Evaluation (MEE) of all 39 tiger reserves in India. The category-wise outcome of MEE Process summarized that out of all of them Jim Corbett, Bandhavgarh, Bandipur, Kanha, Mudumalai, Nagarhole, Pench (Madhya Pradesh) and Dudhwa hold excellent records in tiger population whereas, Annamalai, Bhadra, Kalakkad-Mundathurai, Dandeli-Anshi, Kaziranga, Parambikulam, Mudumalai, Periyar, Bori-Satpura and Sundarbans hold very good, Buxa, Dampa, Satkosia (Odisha), Udanti-Sitanadi, Manas, Pakke, Namdapha, Valmiki, Rajaji, Pench (Maharashtra) and Panna hold good and Indravati, Nagarjunsagar-Srisaillam, Kawal, Sariska, Nameri, Sanjay-Dubri, Sahyadri have satisfactory results.

Conservationists rejoiced when the figures of number of tigers from 2011 census were released. According to the second all-India tiger population estimation study, carried out in the designated 39 tiger reserves across the country, there found an increase of 295 tigers in India. Some exhaustive studies indicate that better protected tiger source sites, especially tiger reserves, have maintained viable tiger populations, however, the area occupied by tigers outside protected areas has decreased considerably. This demonstrates the need for securing corridors for tigers to move between source sites. The existing tiger reserves represent around one-third of India's high density forest area.



***Delhi Government bars tourism in eco-sensitive zones***

Government of India has enacted Biological Diversity Act, 2002 (BDA 2002) according to which national, state and local level mechanisms have been provided for implementation of the Act. At national level, National Biodiversity Authority (NBA) was established by Government of India on 1 October 2003.

The Government aims to promote capacity building and awareness raising activities, already initiated in five Project States, namely Andhra Pradesh, Gujarat, Himachal Pradesh, Sikkim and West Bengal which assist the States in notifying threatened species in their areas of jurisdiction. So far the species which are on the verge of extinction have been notified in fifteen states and one UT (A&N Islands). The activities facilitate projects related to digitations of biodiversity-related data, design/implement the Indian Biodiversity Information System (IBIS), undertake/facilitate projects related to biodiversity conservation such as, The Economics of Ecosystems and Biodiversity (TEEB), etc. The ecosystem is like a building in which we live, removing a few bricks or planks of wood from some random places may not affect us immediately and it may seem to be of no consequence, however, when we continue to remove bricks and planks of wood from all floors of the very building in which we live and do not replace them, the consequence is anybody's guess and just a matter of time. This analogy can easily be applied to the ecosystem biodiversity. Extinction of a few species may not have affected us grossly till now but as we continue to put various species of plants and animals in the endangered list, it may affect us in ways that we have never even thought of. For example, the use of pesticides can remove pollinators from the environment and the extinction of pollinators would mean that we will have to look for some other (expensive) means of pollination, and hence for variation in plant for better adaptability and sustenance which will further increase the price of food and indirectly affect economy adversely.

From the above details it clearly emerges that our mother nature is facing an unprecedented threat. However, it also emerges that we are taking measures to overcome this situation and to make the earth a safe place for all creations. As responsible global citizens, it is our duty to alleviate the situation while we still have the time. We know that we are on the job but modern scenario demands to expedite it.

24. Delhi is increasingly becoming an arid zone. What are the causes and effects of this change? (5)
25. During a visit to my ancestral state, I saw a peculiar bird which my father told me was a sparrow. The efforts of the government and the NGOs have helped in the restoration of their numbers. Enlist the steps which must be taken to help them survive so that their number does not decline again. (5)