

Introduction to Biology (LS1101)

Mid-semester Exam – 26th September 2024
Examiner: Sumana Annagiri

Total Marks: 18
Time: 1.5 hours

- Answer any 6 of the following questions, 1 mark each:

1. Land area used for grazing our livestock has increased from 16% in 1900 to 32% in 2020. Mention three implications of this change for the survival of wildlife?
2. Look at the following image – this is a butterfly called the common crow. A student described the genotype of the right wing of this butterfly and said that it has 14 big white spots and 24 small white spots. Would you agree? Justify your answer.



3. According to the "Cosmic calendar" humans have been on earth for a very long time. Do you agree with this statement or do you disagree. Justify your answer.
4. What are the three major lineages formed by LUCA? What is the lineage that humans belong to and why?
5. In your opinion, what makes something alive? Can a part of a cell, like DNA or mitochondria, be considered alive?
6. Why do scientists believe that all living forms have been derived from a single ancestor?
7. What is the estimated number of living organisms on earth and what is the subset that has been identified with a unique name?

- Answer any 3 of the following 4 questions. Each consists of 2 marks.

8. Outline one experiment that can be performed to examine the theory of spontaneous generation of life.

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9. Build a phylogenetic tree with the following information. At the current time 5 different species (X, Y, C, R, T) are surviving. X had B as its ancestor 2 million years back, while C, R and T was derived from an ancestor O, 8 million years back. Further O & B were related to their most recent common ancestor W which occurred 12 million years back. While Y is a living fossil and has been around for 12 million years and its relationship with other organisms mentioned is not known.
10. Does RNA have an important role in chemical evolution? Are we currently living in a world dominated by RNA as the main information storage macro molecule, justify your reply?
11. When several species live together in one ecosystem they are bound to interact with each other. Can you list 2 possible interactions among them with at least one example each.
- **Answer any 2 of the following 3 questions. Each consists of 3 marks.**
12. Fifty years back there were 100 mice that lived for 1 year each in an island. Also, this island has had about 100 mice for the last 10,000 years. At present there are 300 mice and each is living for 2 years in this same island. Make a graphical representation of what is expected in terms of number of mice over the next 1000 years. Explain your answer in a couple of sentences. Does this mirror what is happening to humans?
13. A journalist wrote that Earth has already seen 5 mass extinctions and 90% of all species that lived in the planet has gone extinct. So, he advised that we should not worry about loss of some 500 species in our country. As a student of science, what do you think? Would you agree or disagree with this statement, justify your answer.
14. Consider two kinds of birds that live in Sri Lanka and India.



Both males and females are about the same size and have similar colouration. Those living in Sri Lanka has different coloured patches on its body and has black and white strips near its beak, while those living India has only brown & white patches on its body. The songs they sing are also similar. Outline one experiment you can conduct to examine if they belong to the same species.