Assignment 1

Deadline for submission: 19th March

1. Based on his observations during his voyage across Galapagos islands, what conclusions did Charles Darwin make about evolution?

2. Which type of biopolymer is likely to have evolved first: (i) DNA, (ii) RNA, (iii) Proteins? Give reasons to support your answer.

3. (i) Why does the double-stranded DNA molecule form a helical structure instead of a ladder-like structure?
   (ii) For the given DNA sequence on the forward strand, give the sequence of the other strand, and the mRNA sequence: 5' CAAGTCGTAATGC 3'

4. (i) Referring to the genetic code (the codon usage table), what would be the amino acid sequence of the polypeptide encoded by the following mRNA sequence?
   5' AUGGUGGCCUAUCAUUAGGGGCUU 3'
   (ii) What would be the effect on translation of the above sequence of a single base mutation which gave rise to an A instead of a U at the twelfth base?
   (iii) What would be the effect on translation of the sequence in (i) above, if an extra C was inserted between the 3rd and 4th bases, i.e., between the two G's at positions 3 and 4?

5. Find out if BamHI is a good restriction endonuclease for cutting the SARS-COV-2 genome? Give reasons.

6. The enzymes BamH I and Bgl II recognise different sequences but leave the same sticky ends:
   BamH I: ---------G|G A T C C ------

   BgI II: ----------A|G A T C T ------
   (i)Will the two enzymes result in the same number of fragments in a random DNA sequence? Give reasons.
   (ii)What's the advantage of having such a pair of REs? Explain with example.

7. Both cloning and PCR can be used for making copies of DNA. Give the advantage and limitation of cloning over PCR?