1. Group the following as nitrogenous bases and nucleosides:
Adenine, Cytidine, Thymine, Guanosine, Uracil and Cytosine.
Ans: Nitrogenous Bases - Adenine, Uracil and Cytosine, Thymine;
Nucleosides - Cytidine, guanosine.

2. If a double stranded DNA has 20 per cent of cytosine, calculate the per cent of adenine in the DNA.
Ans: In a DNA molecule, the number of cytosine molecule is equal to guanine molecules & the number of adenine molecules are equal to thymine molecules. As a result, if a double stranded DNA has 20% of cytosine, it has 20% of guanine. The remaining 60% includes both adenine & thymine which are in equal amounts. So, the percentage of adenine is 30%.

3. If the sequence of one strand of DNA is written as follows:
5′-ATGCATGCATGCATGCATGCATGC-3′
Write down the sequence of complementary strand in 5′ → 3′ direction.
Ans: 5′-GCATGCATGCATGCATGCATGCAT-3′.

4. If the sequence of the coding strand in a transcription unit is written as follows: 5-ATGCATGCATGCATGCATGCA TGCATGC-3′. Write down the sequence of mRNA.
Ans:
mRNA: 5′ -AUGCAUGCAUGCAUGCAUGCAUGCAUGC-3′.

5. Which property of DNA double helix led Watson and Crick to hypothesise semi-conservative mode of DNA replication? Explain.
Ans: Complementary base pairing property of DNA double helix led Watson and Crick to hypothesise semi-conservative mode of DNA replication. Watson & Crick observed that the nitrogenous bases are in complementary pairing in two strands of double helix of DNA molecule. Such an arrangement of DNA molecule led them to hypothesize the semi conservative mode of replication of DNA.

6. Depending upon the chemical nature of the template (DNA or RNA) and the nature of nucleic acids synthesized from it (DNA or RNA), list the types of nucleic acid polymerases.
Ans:
(i) DNA dependent DNA polymerase - synthesis.
(ii) DNA dependent RNA polymerase - synthesis.
(iii) RNA dependent DNA polymerase - Retroviral nucleic acid.
(iv) RNA dependent RNA polymerase - cDNA synthesis.

7. How did Hershey and Chase differentiate between DNA and protein in their experiment white proving that DNA is the genetic material?
Ans:
Alfred Hershey and Martha Chase (1952) worked with viruses that infect bacteria called bacteriophages. In 1952, they chose a bacteriophage known as T2 for their experimental material.
They grew some viruses on a medium that contained radioactive phosphorus (p32) and some others on medium that contained radioactive sulphur (s35). Viruses grown in the presence of radioactive phosphorus contained radioactive DNA but not radioactive protein because DNA contains phosphorus but protem

does not. Similarly, viruses grown on radioactive sulphur contained radioactive protein but not radio'active DNA because DNA does not contain sulphur.
Radioactive phages were allowed to attach to E. coli bacteria. Then, as the infection proceeded, the viral coats were removed from the bacteria by agitating them in a blender. The virus particles were separated from the bacteria by spinning them in a centrifuge. Bacteria which was infected with viruses that had radioactive DNA were radioactive, indicating that DNA was the material that passed from the virus to the bacteria. Bacteria that were infected with viruses that had radioactive proteins were not radioactive. This indicates that proteins did not enter the bacteria from the viruses. DNA is therefore the genetic material that is passed from virus to bacteria.

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