Model (A)

Name: **Program:**

Answer the following questions:

Q1) Complete the following statements with suitable answers: (8 Marks)

1) _____ is considered as the control center of the cell, while the _____ is the organized structure of the hole genome of the organism and it is represented as pairs.

2) Three of the differences between DNA and RNA are _____, _____ and _____ .

3) Given a DNA sequence *pattern* = $C\,A\,T\,C\,G\,A\,T\,T$, then $\overline{pattern}$ = _____ .

4) During the "genome replication", the parent DNA molecule _____ and then each parent strand acts as _____ .

Q2) Choose the correct Answer: (4 Marks)

1) All the following are form the excepted benefits of Bioinformatics **EXCEPT:**

 a) identify suspected persons
 b) develop insect-resistant crops
 c) design custom medicine
 d) develop genome databases

2) All the following are from the Bioinformatics workflow **EXCEPT:**

 a) find algorithmic solution
 b) formalize the biological problem
 c) take a decision to solve a biological problem
 d) interpret the practical results

3) All the following processes are legal according to the central dogma of molecular biology **EXCEPT**:

     a) RNA ➔ DNA   b) DNA ➔ RNA   c) RNA ➔ Protein   d) DNA ➔ DNA

4) The last correct index of a *k*-mers appearing in a string *Text* is of length *n* is (using 0-based indexing) is: _____ .

     a) $n - k + 1$ b) $n + k - 1$ c) $n + k$ d) $n - k$

Q3) Define a *simple* tree. Prove that every simple tree with *n* leaves has at most *n* – 2 internal nodes.   (8 Marks)

Q4) Write the mathematical formulation of the "*Limb length problem*". State without prove the "*Limb length theorem*".   (10 Marks)