

Name:

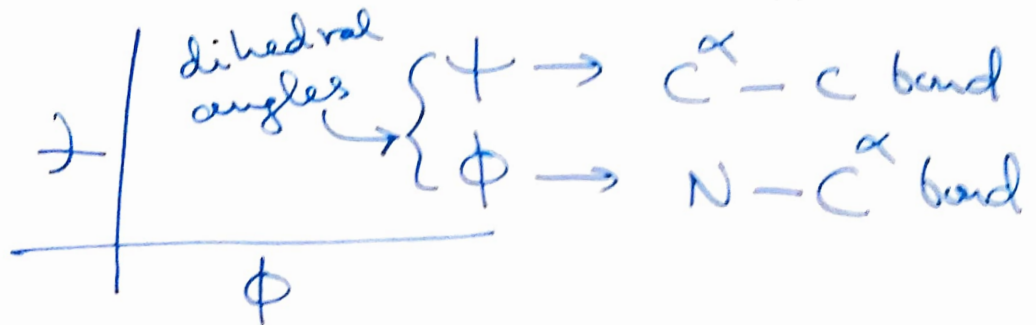
Roll Number:

(If name or roll number is not filled, ZERO marks will be awarded)

1. Identify two structural features where Z-DNA is different from B-DNA

Z DNA	B-DNA
Left handed helix	Right handed helix
12 bps/turn	10-10.5 bps/turn
rise/bp $3.4 \text{ \AA}$	$3.4 \text{ \AA}$
Helix dia $18 \text{ \AA}$	$20 \text{ \AA}$
$\Delta x, \Delta y \neq 0$	$\Delta x, \Delta y \approx 0$

2. What is plotted against what in a Ramachandran Plot. Explain the terms. [1]



3. Name two protein motifs that specifically bind to DNA

→ Helix - turn - Helix ( $\lambda$  repressor)

→ Zinc finger

→ Leucine zipper (GAL-4 fos-jun heterodimer)

→  $\beta$  - barrel (Papilloma virus E2-factor)→  $\beta$  - Saddle (TATA box binding protein)

4. Calculate the distance between C-alphaSer [ $\{x, y, z\} = \{29.69, 17.93, -12.88\}$ ] and C-alpha Leu [ $\{x, y, z\} = \{28.64, 15.35, -10.32\}$ ] in a peptide. All co-ordinates are in Angstrom units. Write all steps showing the calculation.

$$\begin{aligned} d &= \sqrt{(29.69 - 28.64)^2 + (17.93 - 15.35)^2 + (-12.88 + 10.32)^2} \\ &= \sqrt{1.10 + 6.66 + 6.55} \\ &= 3.78 \text{ \AA} \end{aligned}$$

5. The number of DNA molecules per *E. Coli* cell is: [1] (tick the correct option)

- a. 2000
- b. 200
- c. 20
- ☒ d. 2

6. Which of the following is/are TRUE with regard to HYDROPHOBIC EFFECT. (tick all that satisfy the condition, marks shall be awarded only if all correct options are identified)

- ☒ a. Free energy change for transferring side chains of Ala, Val, Leu, Ile, Phe and Tyr from ethanol to water is positive
- ☒ b. Hydrophobic groups aggregate together in the interior of a protein forming a hydrophobic core, while most polar groups are outside interacting with water
- c. The driving force for forming hydrophobic core are direct interactions between hydrophobic groups
- ☒ d. The release of water molecules from ice-like structures that surround hydrophobic groups in water, drives the formation of hydrophobic core