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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

T-2 EXAMINATION, April 2018

B.Tech (BI) II Semester

COURSE CODE: 10B11BI211 **MAX. MARKS: 25**

COURSE NAME: Structural Biology

COURSE CREDITS: 04 **MAX. TIME: 1.5 Hr**

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Marks are indicated against each question.

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1. A person consumed large amounts of sweet pea and showed the symptoms of serious abnormalities of bones, joints and large blood vessels. Explain the biochemical basis of this observation highlighting the structure of protein affected. (3)

2. William Astbury discovered that the x-ray pattern of wool shows a repeating structural unit spaced about 5.2 Å along the length of the wool fiber. When he steamed and stretched the wool, the x-ray pattern showed a new repeating structural unit at a spacing of 7.0 Å. Steaming and stretching the wool and then letting it shrink gave an x-ray pattern consistent with the original spacing of about 5.2 Å. Although these observations provided important clues to the molecular structure of wool, Astbury was unable to interpret them at the time. (3+3)

   (a) Given our current understanding of the structure of wool, interpret Asbury's observations.

   (b)When wool sweaters or socks are washed in hot water or heater in a dryer, they shrink. Silk, on the other hand does not shrink under the same conditions. Explain.

3. Hair grows at a rate of 15 to 20 cm/yr. All this growth is concentrated at the base of the hair fiber, where keratin filaments are synthesized inside living epidermal cells and assembled into rope like structures. The fundamental structural element of α-keratin is the _ helix, which has 3.6 amino acid residues per turn and a rise of 5.4 Å per turn. Assuming that the biosynthesis of _-helical keratin chains is the rate-limiting factor in the growth of hair, calculate the rate at which peptide bonds of keratin chains must be synthesized(peptide bonds per second) to account for the observed yearly growth of hair. (3)

4. Explain the Chou-Fasman and GOR methods of secondary structure prediction? (4)

5. The digestive tract of the larvae of clothes moths is a strongly reducing environment. Why is this beneficial to the larvae? (3)

6. Explain how we use hydropathy plot to detect transmembrane regions in proteins. (3)

7. Explain the meaning of transition temperature in membranes. Which factors govern the transition temperature? (3)