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Total Number of Pages : 02

B.Tech
PBT4D001

4th Semester Regular / Back Examination 2018-19
BIO-MOLECULES AND CELL SIGNALING
BRANCH : BIOTECH

Time : 3 Hours

Max Marks : 100

Q.CODE : F949

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Only Short Answer Type Questions (Answer All-10)

(2 x 10)

- How does bending of DNA occur? Write its importance?
- What is the cap of mRNA? Why is it required?
- What is the c-value paradox? Why is it called so?
- What do you understand by equilibrium binding?
- What is a Zwitter ion?
- What is Z-DNA? Mention its importance?
- What happens to a molecule of DNA which is heated to 70-80°C and then subsequently cooled?
- Define siRNA?
- What do you mean by nonlinear least squares analysis?
- Explain the importance of T_m value in DNA?

Part- II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)

(6 x 8)

- Define the hydrophobic and hydrophilic interactions? How do they influence the structure of biomolecules?
- Describe the structure and biological importance of different types of RNA?
- Describe the forces that stabilize the protein structure with illustration?
- Explain the Phenomenological binding models vs. rigorous models of allosteric regulation?
- Describe the four major types of biological macromolecules?
- What are regulatory enzymes? Describe allosteric regulations of enzymes?
- Discuss the role of laser optical tweezers in single molecule study?
- Discuss about the factors that affect the conformation of biological macromolecules?
- Describe the tertiary motifs in RNA structure and folding?
- Explain in detail binding polynomials and partition functions?
- Discuss the role of atomic force microscopy in single molecule study.
- Explain the conformational study involved in determining the structure of a protein with example?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Write short notes on Boltzmann distributions? Derive the Boltzmann distribution constant by using different parameter? **(16)**

Q4 Discuss in detail the mechanisms of protein-ligand and protein-protein interactions? **(16)**

Q5 What is counterion condensation theory? Briefly explain the effect of salt concentration and type on nucleic acid structure and nucleic acid-protein interactions? **(16)**

Q6 What do you understand by FRET? How to study single molecule interaction using FRET? **(16)**