Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech.**
PBT4D001

4th Semester Regular / Back Examination 2017-18
BIO-MOLECULES AND CELL SIGNALING
BRANCH : BIOTECH
Time : 3 Hours
Max Marks : 100
Q.CODE : C1135

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Part – A (Answer all the questions)

Q1 **Answer the following questions : *multiple type or dash fill up type :*** **(2 x 10)**

a) Number of chiral carbon atoms in β-D-(+)-glucose is
(a) Five
(b) Six
(c) Three
(d) Four

b) Because proteins can absorb light maximally at 280 nm, they can be identified and quantified in solution by using a spectrophotometer. Which of the following is true about the absorption of light by proteins?
(a) Proteins absorb infrared light.
(b) All amino acids absorb light equally.
(c) The greater the concentration of protein in a solution, the more 280 nm transmitted light will be detected by a spectrophotometer.
(d) Absorbance of 280 nm light by proteins increases with the concentration of the protein

c) Based on reducing or non-reducing property, Sucrose is a _____.

d) How does the hydrophobic effect influence the structures of large molecules?
(a) Nonpolar molecules are not easily solubilized in water and aggregate
(b) Polar groups are oriented on the surface, interacting with the water
(c) Nonpolar molecules can mask the polar characteristics of the hydrophilic molecules
(d) a) and b)

e) Each polypeptide in a protein has amino acids linked with each other in a specific sequence. This sequence of amino acids is said to be _____.
(a) Primary structure of proteins.
(b) Secondary structure of proteins.
(c) Tertiary structure of proteins.
(d) Quaternary structure of proteins.

f) The loss of protein structure is called _____.

g) Macromolecules that are composed of carbon, hydrogen, and oxygen in a 1:2:1 ratio is called _____.

h) A segment of DNA has 120 adenine and 120 cytosine bases. The total number of nucleotides present in the segment is _____.

i) In a lipid bilayer _____ tails point inward and form a region that excludes water.

j) A dehydration reaction typically produces _____.

Q2 **Answer the following questions : *Short answer type :*** **(2 x 10)**

a) What is counterion condensation theory?

b) Write the full form of ITC and DSC method

c) Name the type of sugar which gives a positive Benedict's test with heating.

d) Differentiate between Paralogs and orthologs ?

e) Single molecule fluorescence resonance energy transfer is a biophysical technique used to measure distances _____.

f) What is limit of resolution ?

g) What is c-value paradox? Why it is called so?

h) In DNA what are the length of H-bonds between A and T, G and C?

i) Why ionic compounds are with high melting point?

j) Why covalent molecules are non-volatile?

Part – B (Answer any four questions)

Q3 **a)** Write short notes on Boltzmann distributions? Derive the Boltzmann distribution constant by using different parameter? **(10)**

b) Briefly explain nonlinear least squares analysis. **(5)**

Q4 **a)** What are macromolecules? Describe the structure of major types of biological molecules? **(10)**

b) Write short notes on mechanisms of protein-ligand and protein-protein interactions. **(5)**

Q5 **a)** What is Signal transduction? Explain diagrammatically. Which are the possible factors which influence signal amplification? **(10)**

b) Write different types of molecular interaction in macromolecules structure? **(5)**

Q6 **a)** What do you understand by FRET? How to study single molecule interaction using FRET? **(10)**

b) Write the structure of DNA exists in three conformations: A-DNA, B-DNA and Z-DNA **(5)**

Q7 **a)** What are regulatory enzymes? Describe allosteric regulations of enzymes? **(10)**

b) Briefly explain single molecule force spectroscopy monitored by laser optical tweezers? **(5)**

Q8 **a)** Describe the process of nonlinear least squares analysis by SPR method. **(10)**

b) How covalent modification of enzymes activates latent enzymes? **(5)**

Q9 **a)** Describe the tertiary motifs in RNA Structure and Folding? **(10)**

b) Write a short note on protein-protein interaction **(5)**