**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27**

Register Number:

Date:

**B. Sc. CHEMISTRY – VI SEMESTER**

**SEMESTER EXAMINATION – APRIL 2020**

**CH 6215 – BIOCHEMISTRY**

**Time: 2.5 hrs Maximum Marks: 70**

**Note:** This question paper has **two** printed pages and **three parts** (twenty one questions).

**PART A**

Answer any **six** questions of the following: **6 X 2 = 12 marks**

1. Life on earth is considered to be carbon based. Mention the attributes of carbon in this regard.
2. Define saponification number. What is its significance?
3. Give the zwitterionic structure of proline.
4. Briefly explain Koshland’s induced fit theory.
5. Why DNA replication is known as semiconservative?
6. How does an α-amino acid react with ninhydrin?
7. Name the hormone referred to as i) the fight, flight and fright hormone ii) anti-diuretic hormone
8. State Chargaff’s rule of base-pairing in DNA.

**PART B**

Answer any **eight** questions of the following: **8 X 6 = 48 marks**

1. i) One of the main reasons for existence of life on earth is presence of water. Give any three important properties of water which supports life.

ii) How are lipids classified? What is their role in the biological system? **(3+3)**

1. Draw the partial structures of amylose of starch and glycogen. Give any two differences between starch and glycogen.
2. With the help of neat labelled diagram explain the fluid mosaic model of animal cell membrane.
3. Give the Lineweaver-Burk plots for competitive, non competitive and uncompetitive inhibitions. How does Km and Vmax vary in each case.
4. What are the different types of specificities exhibited by enzymes? Give an example for each type.
5. i) What is a peptide bond? Give its characteristics.

ii) Draw the structure of ATP and explain why it has a high phosphoryl transfer potential? **(3+3)**

1. i) Write the reactions of pay-off phase of glycolysis which yield ATP through substrate level phosphorylation.

ii) Name any two classes of hormones based on their chemical nature and give an example for each class. **(3+3)**

1. Give the reactions catalysed by the following enzymes, along with the required coenzymes i) isocitrate dehydrogenase ii) triose phosphate isomerase iii) phosphofructokinase-1.
2. Classify amino acids on the basis of their R-groups and give an example for each class?
3. Explain with the help of a neat diagram, the formation of the intiation complex during translation. Name the initiation codon and any one termination codon.

**PART C**

Answer any **two** of the following: **5 X 2 = 10 marks**

1. i) A short nucleotide sequence of a DNA molecule is given below. Label the strands of this DNA in the context of transcription. Give the corresponding m-RNA sequence and indicate the direction of its nucleotide sequence.

**5’** ATGGTATTAG **3’**

**3’** TACCATAATC **5’**

ii) Assuming the average molecular weight of a deoxyribonucleotide pair as 618, find the number of turns in a DNA molecule of molecular weight 6 X 106. **(3+2)**

1. Consider the following reaction at equilibrium, which occurs in glycolysis.

fructose-6-phosphate glucose-6-phosphate (K’eq=1.97)

i) What is ΔG⁰ for the reaction (K’eq measured at 25⁰C)?

ii) If the concentration of fructose-6-phosphate is adjusted to 1.5 M and that of glucose-6-phosphate to 0.5 M, what is ΔG?

iii) Why are ΔG⁰ and ΔG different?

(Faraday’s constant = 9.65 X 104 Cmol-1; R = 8.314JK-1mol-1).

1. i) Write the structures for the following fatty acids
2. myristoleic acid (14:1Δ9)
3. erucic acid (C22, ω-9)

ii) What is the net yield of ATP on complete oxidation of lauric acid (a saturated C12 acid) by β-oxidation pathway. **(2+3)**

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