BITS, PILANI – DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY
FIRST SEMESTER 2010 – 2011
BIO C211 BIOLOGICAL CHEMISTRY
COMPREHENSIVE EXAMINATION (CLOSED BOOK)

Duration: 3 hours. **Date: 21.12.2010**
Weightage: 40% **Max. Marks: 40**

Note: a) Attempt all questions in the order; b) Answer all questions
c) Answer to the point and d) Draw schematic diagrams if required

1. Write a brief account on classification of aminoacids with suitable examples. [2.0]
2. What is the peptide bond? Draw the general structure of the peptide linkage in a polypeptide chain. [2.0]
3. Many of the small peptides are physiologically active and possess important applications in medicine. Explain the composition and role of (a) Glutathione and (b) Pentapeptides with examples. [2.5]
4. How the protein structures are stabilized and mention the different interactions? What is the role of the following in protein structure analysis? [1.5]
   a. Urea
   b. B-Mercaptoethanol
   c. Guanidine hydrochloride
5. What are steroid hormones? Give at least three examples and name the precursors molecule. [1.0]
6. What is the composition of starch and glycosidic linkages? Mention the enzymes involved in the complete cleavage of starch to glucose? Use a schematic diagram representing the complete enzymatic hydrolysis of starch. [1.0+2.0 = 3.0]
7. What is the chemical composition of lignin? Mention its functions in woody plants. [1.0]
8. Many enzymes act as markers for human diseases. Mention (a) any one marker enzyme, (b) compartmentalization (location), (c) composition, and (d) how it is used as a marker. [2.0]
9. What are enzyme inhibitors and give any two examples? Describe different types of enzyme inhibition with suitable diagram. [1.0+2.0 = 3.0]
10. What are coenzymes and cofactors and give examples for each? Draw suitable diagrams for each on interactions with the enzymes. [2.0]
11. How are production and use of energy coupled? Explain. [1.0]
12. What is the composition of Coenzyme A? How is Coenzyme A is involved in activation of metabolic pathways? Explain. [2.0]
13. How is glyceraldehyde-3-phosphate is converted to pyruvate? Mention (a) biochemical reactions involved in the pathway, (b) enzymes and (c) energetics. [3.0]
14. What is role of HMP shunt (or) pentose phosphate pathway? Briefly explain on (a) oxidative and (b) non oxidative reactions of PPP. [1.0+2.0 = 3.0]
15. What are the energetics of the citric acid cycle and mention the reactions in which the reducing equivalents are generated? How it is controlled? [4.0+1.0= 4.0]
16. What is the difference between the oxidative phosphorylation and photophosphorylation? How it vary from the photorespiration? [2.0]

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17. Explain in detail with the composition, organization and functioning of enzyme complexes involved in biological oxidation. Draw a schematic diagram of ATP synthesis with respect to chemiosmotic model. [3.0]
18. How the carbohydrate, lipid, amino acid and protein metabolism are interlinked? What is your understanding of the biochemistry with respect to diseases and heath? Justify with your reasons, and possible prevention methods. Any two can be used as an example for illustration. [2.0]
    a. Diabetes mellitus (DM)
    b. Coronary Heart Disease (CHD)
    c. Obesity and Slimming
    d. Genetic Disorders of Metabolism

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FIRST SEMESTER 2010 – 2011
BIO C211 BIOLOGICAL CHEMISTRY
TEST-II (OPEN BOOK)

Duration: 50 min. **Date: 7.11.2010**
Weightage: 20% **Max. Marks: 20**

Note: a) Attempt all questions in the order, b) Answer all questions and c) Answer to the point

1. Differentiate between the role of FADH2 and NADH with respect to oxidation-reduction reactions with suitable examples. [3.0]

2. Why the Glucose-6-phosphate can give out less energy than an ATP? Briefly explain. [2.0]

3. Briefly explain on substrate level phosphorylation. Why the cells to carry out such biochemical reaction when electron transport chain generate much of the energy requirements of a cell. [3.0]

4. The Gram positive bacterium *Lactobacillus lacti* produce lactic acid. Propose a general pathway for the production of the acid and its relation with bioenergetics. [2.0]

5. What is the basic difference between anaerobic metabolism and aerobic metabolism of bacteria? Explain with suitable biochemical pathways in terms of bioenergetics and end products. [3.0]

6. Why would an organism synthesize glucose and at the same time use glucose to generate energy? Briefly explain with regulatory enzymes. [3.0]

7. How the interconversions of monosaccharides and 4 carbon, 5 carbon sugars are made. Why? Explain each with a suitable example and enzymes involved in each case. [4.0]

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BIO C211 BIOLOGICAL CHEMISTRY
TEST-I (CLOSED BOOK)

Duration: 50 min. **Date: 26.9.2010**
Weightage: 25% **Max. Marks: 25**

Note: a) Attempt all questions in the order, b) Answer all questions and
c) Answer to the point

1. Name any two subcellular organelles and marker enzymes with clinical correlations.[3.0]

2. What are reducing sugars? Give example. [1.0]

3. Write any one biologically important carbohydrate ester and mention functions. [2.0]

4. What are amino sugars? Give any two examples with functions. [2.0]

5. Differentiate between maltose and cellobiose and mention their sources. [2.0]

6. Write a brief account on plant starch composition, glycosidic linkages and applications. [2.0]

7. What are Glycoproteins? Give examples and their functions. [3.0]

8. Give examples for each of the following: [2.0]
   a. Acidic aminoacids
   b. Basic aminoacids
   c. Hydrophobic aminoacids
   d. Uncommon aminoacids

9. Write a brief account on Glutathione. [2.0]

10. Describe primary and secondary structure of proteins and stabilizing forces. [3.0]

11. How the proteins are organized in tertiary and quarternary structures? Explain with a suitable example. [3.0]

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QUIZ-II (CLOSED BOOK)

Duration: 15 min. **Date: 30.11.2010**
Weightage: 7% **Max. Marks: 7**

Name: **ID No.**

Note: *a) Answer all questions and b) answer to the point*

1. Brief on the composition, cofactor requirements and functions of Pyruvate Dehydrogenase enzyme complex. [2.0]

2. What are the regulatory sites of TCA cycle in eukaryotes and prokaryotes. [2.0]

3. How TCA cycle play roles in anabolism? Give at least two intermediates and its anabolic products. [1.0]

4. What are anaplerotic reactions? Give one example. [1.0]

5. What is glyoxylate cycle? Mention the key biochemical reaction with the enzyme. [1.0]

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QUIZ-I (CLOSED BOOK)

Duration: 15 min. **Date: 19.10.2010**
Weightage: 8% **Max. Marks: 8**

Name: **ID No.**

Note: *a) Answer all questions and b) answer to the point*

1. What are isozymes and briefly explain with respect to enzyme as disease markers? [2.0]

2. Write the Michaelis-Menton equation and mention its significance. [2.0]

3. Differentiate Competitive, non-competitive and uncompetitive enzyme inhibition with a schematic diagram for each. [1.5]

4. How does phosphorylation of specific residues regulate enzyme activity? [2.0]

5. What are Coenzymes? Give an example. [0.5]