

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

SSC2103

FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE EXAMINATIONS

DEPARTMENT OF SPORTS SCIENCE AND COACHING

**SUPPLEMENTARY: SSC2103: PRINCIPLES OF BIOCHEMISTRY**

JULY 2005

3 HOURS (100 MARKS)

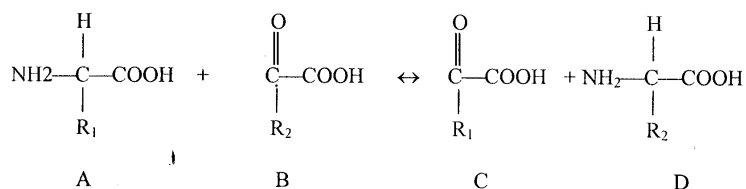
**INSTRUCTIONS**

Answer any four questions only. Each question carries 25 marks. Where a question contains subdivisions, the mark value for each subdivision is given in brackets. Illustrate your answer where appropriate with large clearly labeled diagrams.

- 1 a) Which co-enzyme is utilized by the transaminases? Explain briefly what is meant by transamination and give a description of the role of the co-enzyme. (10 marks)
- b) Consider the following sequence of reactions involved in glycolysis.  
3 phosphoglycerate  $\rightarrow$  2 phosphoglycerate  $\Delta G^{\circ} = 4.441 \text{ kJ/mol}$   
2 phosphoglycerate  $\rightarrow$  phosphoenolpyruvate +  $\text{H}_2\text{O}$   $\Delta G^{\circ} = 2.581 \text{ kJ/mol}$   
  
2 phosphoenolpyruvate + ADP  $\xrightarrow{\text{H}^+}$  pyruvate + ATP  $\Delta G^{\circ} = -25.521 \text{ kJ/mol}$
- (i) Write down the overall reaction. (6 marks)  
(ii) Calculate  $\Delta G^{\circ}$  for the overall reaction. (4 marks)
- c) Answer the following questions about RNA.  
(i) What is the name of the bond joining the ribonucleoside components to one another? (1 mark)  
(ii) What bases pair with one another in RNA? (2 marks)  
(iii) What are the major 3 classes of RNA found in a cell and which is the most abundant? (2 marks)
2. a) Write an essay on the structural organization of the protein molecule. (20 marks)
- b) Histamine and tryptamine can be produced from certain amino acids. What are the respective amino acid precursors and what type of reaction do they undergo? (5 marks)
3. Write an essay explaining how different conditions such as pH, temperature, etc affect the activity of enzymes. (25 marks)
4. a) Describe the chemical nature of bases present in DNA and show how certain pairs are able to form hydrogen bonds in the DNA molecule (Detailed structures are not required). (6 marks)
- b) Identify 4 features that differentiate RNA from DNA. (4 marks)

c) Write an essay on **either** the nature of the genetic code **or** the Cori cycle. (15 marks)

5. a) The equation below represents a reaction which occurs in the liver and other body cells.



Give the name of:

- (i) The type of compound labeled A. (1 mark)
- (ii) The functional group common to all the four molecules. (1 mark)
- (iii) The functional group that molecule A is donating to molecule B. (1 mark)
- (iv) The type of reaction of which this is an example. (1 mark)
- (v) Give one reason why this reaction is important in the body? (1 mark)
- (vi) Suggest one possible fate of molecule C. (1 mark)

b) Surplus dietary amino acid may be converted into:

- (i) Proteins
- (ii) Fats
- (iii) ketone bodies
- (iv) Glucose
- (v) None of the above (4 marks)

c) Discuss the biochemical features of muscle contraction. (15 marks)

6. a) Briefly describe how ketone bodies are formed. What is the significance of ketone body formation? (10 marks)

b) Anabolic steroids are usually derivatives of testosterone. Describe the structure and biological function of testosterone. (15 marks)

**END OF EXAMINATION QUESTION PAPER**