R09

Code No: C0304

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I - Semester Examinations March/April-2011
BIO CHEMISTRY AND METABOLIC REGULATION
(BIOTECHNOLOGY)

Time: 3hours **Max.Marks:60**

Answer any five questions
All questions carry equal marks

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1. The concentration of glucose in human blood plasma is maintained at about 5mM. The concentration of free glucose inside muscle cells is much lower. Why is the concentration so low in the cell? What happens to the glucose upon entry into the cell? [12]

2. Propose a reaction mechanism for the condensation of acetyl CoA and glyoxylate in glyoxylate cycle of plants and bacteria. [12]

3. Describe the chemical composition and configuration of enzymes and discuss the factors that modify enzyme structure and /or function. [12]

4. After an enzyme is mixed with its substrate, the amount of product formed is determined at 10-second intervals for 1 minute. Data from this experiment are shown below:

Time (sec)	0	10	20	30	40	50	60
Product formed (mg)	0.00	0.25	0.50	0.70	0.80	0.85	0.85

Draw a graph of these data and answer the following questions.
   a. What is the initial rate of this enzymatic reaction?
   b. What is the rate after 50 seconds? Why is it different from the initial rate?
   c. What would be the effect on product formation if the enzyme where heated to a temperature of 100° C for 10 minutes before repeating the experiment? Why?
   d. How might altering the substrate concentration affect the rate of the reaction? Why?
   e. How might altering the pH affect the rate of the reaction? Why? [12]

5. a. Outline the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis.
   b. Explain how the rate of photosynthesis can be measured. [12]

6. Describe the fluid-mosaic model of a plasma membrane. Discuss the role of the membrane in the movement of materials through it by each of the following processes:
   a) Active transport
   b) Passive transport. [12]

Contd…2

7. The response of hormone receptors to signals are gradually inhibited once the pathway is fully activated. From what you have learned about signalling pathways, propose a mechanism for this process of receptor down regulation. [12]

8. Enzymes are biological catalysts.
   a) Relate the chemical structure of an enzyme to its specificity and catalytic activity.
   b) Design a quantitative experiment to investigate the influence of pH or temperature on the activity of an enzyme.
   c) Describe what information concerning the structure of an enzyme could be inferred from your experiments. [12]

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