

Uva Wellassa University, Sri Lanka
End Semester Examination – March 2011
MRT 201-1 Biology for Mineral Science



Time: One (01) hour

Total six 06 Questions

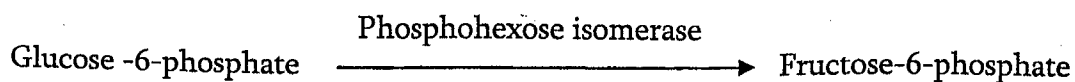
Answer two (02) questions from part "A" and two (02) questions from part "B".

Part A

1.
 - a) State the differences between promoter and operator (04 marks)
 - b) Diagrammatically illustrate the structural difference of unit of inheritance between *Oryza sativa* and *Pseudomonas aeruginosa*. (10 marks)
 - c) Briefly explain the regulation of gene expression using "lac operon" (11 marks)

2.
 - a) What are the differences between total count and viable count? (04 marks)
 - b) Name the most important thermophilic microorganism found in nature which is widely used in Molecular Biology. State the importance of that microorganism. (06 marks)
 - c) A second year university student was asked to prepare a bacterial pure culture from soil sample. Using your knowledge, briefly explain the experimental procedure to prepare a pure culture from a given soil sample. (15 marks)

3.
 - a) Draw the graphs of
 - i. substrate concentration vs enzymatic rate when the enzyme concentration is limited.
 - ii. Enzyme concentration vs enzymatic rate when the substrate concentration is limited. (08 marks)
 - b) Phosphohexose isomerase enzyme catalyses following reaction



A group of microbiologists in California University was conducted a research on the behavior of Phosphohexose isomerase enzyme of certain soil microorganism. In order to detect the responses of that enzyme to various compounds, they injected several compounds in to the microbial culture plate. Some of the results they obtained are as follows.

Compound	Initial Fructose-6-phosphate Concentration (mol dm^{-3})	Final Fructose-6-phosphate Concentration (mol dm^{-3})
X	0.24	1.26
Y	0.24	0.24
Z	0.24	0.02

- Briefly explain the physiological background of the results (12 marks)
- c) Briefly explain the effect of temperature on the rate of enzymatic reaction. (05 marks)

Part B

- 4.
- What is soil? (03 marks)
 - What is rhizosphere? (04 marks)
 - List three (03) physiochemical factors effecting on the growth of microorganisms in rhizosphere environment. (06 marks)
 - Briefly explain, how above factors effect on the growth of bacteria in rhizosphere. (12marks)
- 5.
- Define the biogeochemical cycle. (04 marks)
 - Explain the three (03) basic components of a model of nutrient cycle. (09 marks)
 - Briefly explain the microbiological activities in,
 - Sulfur cycle
 - Phosphorus cycle
 - Ion cycle
 (12 marks)
6. Write short notes on any two (02) topics from the followings;
- Explain classification criteria and activities of Sulfur bacteria (12.5 marks)
 - Presumptive test (12.5 marks)
 - Ion bacteria (12.5 marks)
 - Diversity of green algae in fresh water (12.5 marks)