BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

AGH 112

Department of Crop Science

BSc Agricultural Science (Honours) Part I Examination
Introduction to Microbiology

3 HOURS (100 Marks)

5 MAR 2024

INSTRUCTIONS

Answer any ***FOUR*** questions. Each question carries **25 marks.**

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1. a) Discuss the five steps used to characterize microorganisms in the laboratory. **[15 marks]**

   b) With the aid of a diagram, discuss the role of microorganisms in the Carbon Cycle. **[10 marks]**

2. a) Using appropriate examples, explain spore formation in bacterial cells. **[10 mark]**

   b) Explain the morphological features of protozoa. **[15 marks]**

3. Answer the following questions as applicable to the Embden Meyerhof Parnas pathway:

   a) Name the enzyme(s) that catalyse reactions where ATP is synthesised. **[2 Marks]**

   b) Name the enzyme(s) that catalyse reactions where ATP is consumed. **[2 Marks]**

   c) Describe the stage(s) that lead to the production of NADH. **[5 Marks]**

   d) Describe the stage(s) that is/are regulated. **[5 Marks]**

   e) Calculate the net yield of ATP made anaerobically in the conversion of 1 (mole) of glucose to pyruvate. NB: Do not include those generated from NADH. **[5 Marks]**

   f) Suppose you discover a mutant yeast whose glycolysis pathway is shorter because of the presence of a new enzyme that catalyses the reaction:

   $$\text{Glyceraldehyde 3-phosphate} + H^2O + NAD^+ \longrightarrow \text{3-phosphoglycerate} + NADH + H^+$$

   Determine the net yield of ATP made anaerobically in this mutant yeast in the conversion of 1 (mole) glucose to pyruvate by this shortened pathway. **[6 Marks]**

4. a) Discuss any five (5) nutritional types in microorganisms. **[15 marks]**

   b) Explain the two (2) main transport mechanisms in microbes. **[10 marks]**

5. Write notes on the following;

   i. Generation time, **[5 marks]**

   ii. Theory of Endosymbiosis, **[5 marks]**

   iii. Pleomorphism , **[5 marks]**

   iv. Peptidoglycan and, **[5 marks]**

   v. Glycocalyx. **[5 marks]**

6. a) Explain any five (5) factors that affect the death rate of a microbial population. **[10 marks]**

   b) Describe any five methods of chemical control in microbiology. **[15 marks]**

End of Exam Paper