

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE

MAR 2013

CHEMISTRY DEPARTMENT

BSc in CHEMICAL TECHNOLOGY

COURSE: CH 403: FERMENTATION TECHNOLOGY

2 HOURS

Answer **ALL** questions in **Section A** and any **four (4)** questions in **Section B**. Each question carries **20 MARKS**.

SECTION A

1. (a) What economic importance may be attached to each of the following microbes in fermentation processes?
- (i) *Penicillium camemberti*
 - (ii) *Xanthamonas*
 - (iii) *Aspergillus sp.*
 - (iv) *Saccharomyces sp.*
 - (v) *S. cerevisiae*
- [5 marks]**
- (b) Explain why microorganisms are the preferred tool for industrial biotechnology. **[5 marks]**
- (c) Describe the long term beneficial impacts of industrial biotechnology. **[10 marks]**

SECTION B: Answer any four (4) questions from this section.

2. (a) What is sauerkraut? **[1 marks]**
- (b) During fermentation, reactions involving carbohydrates and carbohydrate like materials are referred to as what. **[1 marks]**

- (c) Give four reasons why sterilization is very important in fermentation industries. **[4 marks]**
- (d) What are advantages and disadvantages of using a batch culture system over a continuous culture system? **[6 marks]**
- (e) Complete the table below.

	<i>Primary metabolite</i>	<i>Producing organism</i>	<i>Commercial significance</i>
(i)	<i>Glutamic acid</i>		
(ii)	<i>Lysine</i>		
(iii)	<i>Polysaccharides</i>		
(iv)	<i>Citric acid</i>		
(v)	ethanol		

[14 marks]

- (c) What are Fortified wines. **[4 marks]**
3. Write detailed notes about the Penicillin fermentation. Your answer should include, applications, producing organisms, production conditions, graphs, etc. **[20 marks]**
4. (a) Discuss the commercial production of Mahewu **[14 marks]**
- (c) Discuss the merits and demerits of an Air-lift bioreactor over a Stirred-tank bioreactor. **[4 marks]**
- (d) What is the purpose of an impeller in a bioreactor. **[2 marks]**
5. (a) In the pasteurization of milk products, what does the abbreviation HTST stand for? **[2 marks]**
- (b) Define the following; syneresis, whey and inoculation? **[6 marks]**
- (c) Outline the stages taken during cheese manufacture. **[8 marks]**
- (d) What is the difference between Swiss cheese and Cheddar cheese? **[4 marks]**

6. (a) Beer and wine are both alcoholic beverages commercially produced in Zimbabwe. Give a detailed account of the lager beer making process. **[15 marks]**
- (b) Outline the criteria for selection of recovery process for fermented product. **[5 marks]**
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END OF QUESTION PAPER