BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF SCIENCE

CHEMISTRY DEPARTMENT

MAR 2024

BSc in CHEMICAL TECHNOLOGY

COURSE: CH 403: FERMENTATION TECHNOLOGY

2 HOURS

Answer **ANY FIVE (5)** questions. Each question carries **20 MARKS**.

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1. (a) Define the following:

i. Trophophase

ii. Chemostat

iii. Fermentative organism **[12 marks]**

(b) The growth of a typical microorganism under batch culture conditions can be illustrated using a graph; can you draw a clearly labeled graph showing all the stages involved during the whole growth period. **[8 marks]**

2. (a) In a continuous culture, if substrate is depleted below the level that supports the growth rate dictated by the dilution rate, a sequence of events takes place; list all these events. **[10 marks]**

(b) Draw a generalized, schematic representation of a fermentation process and explain the processes that occur upstream and downstream of the fermenter. **[10 marks]**

3. (a) Answer using **TRUE or FALSE**

(i) Both Solid State Fermentation (SSF) and Submerged Fermentation (SmF) are used for enzyme production. SmF is usually implemented in case of bacterial enzyme production.

(ii) Wheat bran is a substrate for SmF technique.

(iii) Compactin, Lovastatin, and Pravastatin are direct products of fermentation; they are also called natural statins.

(iv) Penicillin is a primary metabolite. **[8 marks]**

(b) What economic importance may be attached to each of the following microbes in fermentation processes?

(i) Penicillium camemberti
(ii) Corynebacterium glutamicum
(iii) Xanthamonas spp. **[12 marks]**

4. (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]**

5. Write detailed notes on each of the following;

(a) Air-lift bioreactor **[10 marks]**

(b) Stirred-tank bioreactor. **[10 marks]**

6. (a) (i) Describe the physical and chemical properties that take place during the ripening of cheese. **[5 marks]**

(ii) Distinguish between hard and soft cheese. **[3 marks]**

(iii) Give **two** functions of Starter LAB in cheese production. **[4 marks]**

(b) (i) State any **three** blending ingredients for producing fermented meat and meat products. **[3 marks]**

(ii) Give characteristics that would result from fermentation of fish and fish products. **[3 marks]**

END OF QUESTION PAPER