



**FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA  
SCHOOL OF LIFE SCIENCES  
DEPARTMENT OF MICROBIOLOGY**

**FIRST SEMESTER EXAMINATION 2016/2017 SESSION**

**COURSE CODE: MCB 512**

**COURSE TITLE: FERMENTATION TECHNOLOGY (3 UNITS)**

**CLASS: 500 LEVEL**

**TIME: 2 HOURS**

**Section A**

**Instruction: Answer only two (2) questions in this section. Question one is compulsory**

- 1(a). The maximum specific growth rate of an organism used in a chemostat for the production of microbial biomass is  $0.40 \text{ h}^{-1}$  and the specific growth rate dictated by the dilution rate was  $0.30 \text{ h}^{-1}$ , what was the substrate concentration at the steady state and the flow rate if the volume of the reaction vessel was 1.5 L? Assume the substrate utilization constant is  $20 \text{ mgL}^{-1}$ .
- 1(b). A strain of *Lactobacillus bulgaricus* used in the production of yoghurt was known to divide every 30 minutes, if  $1 \times 10^3$  cells were used to inoculate 100 mL liquid milk, how many bacterial cells would be present after 6 h of fermentation? What is the specific growth rate and the generation time of the organism?
- 1(c). Outline the sequence of events that occur when the substrate is reduced below the level that support the growth rate controlled by the dilution rate in a continuous culture system of fermentation.
  
- 2(a). Describe the downstream processing for the purification of an intracellular microbial enzyme.
- 2(b). Enumerate five (5) major groups of industrial fermentation processes with their relevant examples.
  
- 3(a). Explain briefly how industrial fermentation could contribute to the economy growth of a nation.
- 3(b). Distinguish between fed-batch and continuous system of fermentation.
- 3(c). Why is fed-batch system more preferred for the cultivation of baker's yeast?

**Section B**

**Instruction: Attempt any two questions in this section**

- 4(a). Describe food fermentation with appropriate examples
- 4(b). List the two types of fermentation and explain the principles behind any of the listed types with production technique

- 5(a). Explain the advantages and disadvantages of batch fermentation process. What is the role played by head space?
- 5(b). Give two examples of the following fermented foods classified by substrate type:
- (i) Bean based
  - (ii) Fruit based
  - (iii) Dairy based
  - (iv) Grain based
  - (v) Vegetable based
- 6(a). Enumerate the basic functions of a fermenter
- 6(b). Write short notes on the following:
- (i) Baffles
  - (ii) Sparger
  - (iii) Chemostat
  - (iv) Foam control