FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF LIFE SCIENCES
DEPARTMENT OF MICROBIOLOGY
FIRST SEMESTER EXAMINATION 2018/2019 SESSION
FERMENTATION TECHNOLOGY (MCB 512), 3 Units

INSTRUCTIONS: Answer any **Five** (5) Questions, at least two from each Section.

TIME: $2^1/_2$ Hours

SECTION A

1(a). Define 'fermentation technology'.
1(b) What is the basic principle involved in industrial fermentation technology?
1(c) Give at least one example of yeasts, molds and bacteria involved in fermentation
1(d) List 10 major products of fermentation technology produced economically on a large scale.

2(a). What is batch fermentation? Discuss the different phases of microbial growth.
2(b) Describe the process of continuous fermentation using stirred fermenter.
2(c) Fermentation technology can be grouped into four major categories. Discuss

3(a). What is the function of a fermenter?
3(b). Enumerate requirements of a bioreactor
3(c). As a new employee in a brewing industry, you are asked to design bio reactor. What are the important points to consider?

SECTION B

4(a). A bacterial culture has an initial cell density of 0.5×10^3 cell/ml. Its generational time is 30 minutes. What is the cell density at the end of 1hr 20 minutes?
4(b). Assuming a bacterial culture has a doubling time of 40 minutes and allowed to grow so that after 3 hr, it has a final absorbance of 0.03. What is the starting absorbance?
4(c). What is the generational time of a bacterial population that increased from 1×10^4 cells to 1×10^7 cells in 4 hr of growth?

5(a). Briefly explain the components of fermentation process
5(b). In a tabular form, list the major types of filtration processes with their characteristic features.

6(a). What are the principles behind the following purification techniques ? :

i. Centrifugation.
ii Gel chromatography.
iii. Affinity chromatography.
iv Ion exchange chromatography.
v. Liquid-liquid extraction.

6(b). List and explain the three methods of product formulation.

7(a). Assuming a bacterial culture has a doubling time of 20 minutes and a starting absorbance of 0.03. How long does it take for the culture to reach a final absorbance of 0.4?

7(b). A bacterial culture has an initial cell density of 1×10^2 and after two hours (2hr), it has a cell density of 5.4×10^6, Calculate the followings:

(i) Number of generations.
(ii) Generation time.