



**FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA**  
**SCHOOL OF LIFE SCIENCES**  
**DEPARTMENT OF MICROBIOLOGY**  
**SECOND SEMESTER EXAMINATION, 2017/2018 SESSION**

**Course Code: MCB 323**

**Course Title: Microbial Physiology (3 Units)**

**Instruction: Answer 5 questions in all. Attempt at least 1 question in each section**

**Time: 2½ Hours**

**SECTION A**

1. How do the following contribute to generation of energy in bacterial cell?
  - i. Coenzyme
  - ii. Proton motive force (PMF)
  - iii. ATP synthases (ATPase)
  - iv. Oxygen atom
- 2a. Describe the structure of prokaryotic cell membrane.
- 2b. Explain five functions of prokaryotic cell membrane.

**SECTION B**

3. Discuss briefly the mechanisms of transport of materials across the membrane.
4. In a tabular form, differentiate between passive transport and active transport.

**SECTION C**

- 5a
  - (i) Define microbial growth.
  - (ii) With the aid of diagrams, describe the prokaryotic cell cycle.
- 5b.
  - (i) If a bacterial culture that contain  $1 \times 10^3$  cells at the start of log phase divide every 60 minutes, how many bacterial cells will be there after 6hrs of exponential growth?
  - (ii) What is generation time?
- 6a.
  - (i) What is water activity?
  - (ii) How do microorganisms adapt to hypotonic and hypertonic environment?
- 6b.
  - (i) Discuss briefly how oligotrophic environment affect microbial activities.
  - (ii) How do microbial activities affect the pH of their environment and how can it be controlled when culturing in the laboratory?
- 7a. Classify microorganisms into five different groups on the basis of their temperature ranges for growth.
- 7b. Explain briefly how the temperature above the optimum growth temperature of an organisms affect its activities?