# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

**(A Constituent College of JKUAT)**
***Faculty of Applied & Health Sciences***

DEPARTMENT OF PURE & APPLIED SCIENCES

**UNIVERSITY EXAMINATION FOR BACHELOR OF TECHNOLOGY IN APPLIED CHEMISTRY (**ANALYTICAL AND INDUSTRIAL OPTIONS**)**

**AAB 4101:** FUNDAMENTALS OF BIOLOGY

**END OF SEMESTER EXAMINATION**
SERIES: APRIL 2012
**TIME: 2 HOURS**

**Instructions to Candidates:**
You should have the following for this examination

- *Answer Booklet*
- *Illustrate your answers with diagrams and give examples where appropriate*

This paper consists of **FIVE** questions
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are clearly shown
This paper consists of **THREE** printed pages

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**Question 1 (30 marks)**

(a) (i) Name **THREE** important landmarks in the history of microscopy (3 marks)

(ii) Differentiate between the Light Microscope (LM) and the Electron Microscope (EM) (3 marks)

(iii) Explain the uses of the phase contrast microscope (2 marks)

(b) (i) Outline **FOUR** major distinguishing features between prokaryotic and eukaryotic cells (2 marks)

(ii) Explain how the prokaryotes evolved into eukaryotes (3 marks)

(c) (i) Describe the functional classification of cell membrane proteins (2 marks)

(ii) Explain the term "cell membrane fluidity" (2 marks)

(iii) Describe the Singer-Nicolson model structural organization of cell membranes (3 marks)

d) (i) Explain the importance mitotic division (2 marks)

(ii) Explain the importance of synapsis and chiasma formation in first meiotic cell division (2 marks)

(e) (i) Illustrate the structure of the chloroplast (3 marks)

(ii) Explain the photosynthetic adaptations of CAM plants (2 marks)

(d) Explain the following terms:

(i) "Gycolysis" (1 mark)

(ii) Gluconeogenesis" (1 mark)

(e) Draw a food web representing the following: primary producers, primary consumers, secondary consumers, tertiary consumers, Quaternary consumers (5 marks)

**Question 2 (20 marks)**

a) Describe four processes involved in the movement of materials across the cell membrane (12 marks)

b) Describe three molecules involved in transmembrane movement (6 marks)

c) Describe one molecule involved in membrane transport inhibition (2 marks)

**Question 3 (20 marks)**

Explain the processes leading to the formation of the following:

a) Pyruvate from glucose (5 marks)

b) Acetyl CoA from Pyruvate (4 marks)

c) Oxaloacetic acid (8 marks)

d) Lactic acid from pyruvate (3 marks)

**Question 4 (20 marks)**

Describe the following stages of photosynthesis:

a) The light-dependent reaction (8 marks)

b) The light -independent reaction (12 marks)

**Question 5 (20 marks)**

a) Explain what would happen to humans and most other living organisms on Planet Earth if photosynthesis stopped? (4 marks)

b) Explain the importance of energy flow in trophic levels in the context of toxic substances to animals (4 marks)

c) Discuss the impacts of human activities on the ecosystem (8 marks)

d) Explain the concept of global warming (4 marks)