



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

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)
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- (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)