



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2016/2017

**SECOND YEAR SECOND SEMESTER EXAMINATIONS FOR THE
DEGREE OF BACHELOR OF SCIENCE IN HORTICULTURE,
AGRONOMY AND AGRICULTURAL EXTENTION WITH
INFORMATION TECHNOLOGY**

MAIN CAMPUS

AAG 103: INTRODUCTORY MICROBIOLOGY

Date: 8th June, 2017

Time: 8.30 - 11.30 am

INSTRUCTIONS:

- Answer ALL the questions in SECTION A and ANY THREE questions from SECTION B.



AAG 103: INTRODUCTORY MICROBIOLOGY

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ANY THREE QUESTIONS FROM SECTION B

SECTION A (25marks)

Answer all questions from this section

- 1). Using the Abbe (1873) criterion, give a brief explanation of how the resolving power of the light microscope can be optimized to improve the histological examination of prokaryotic microorganisms (3 marks)
- 2). Name any three food reserve materials used by microorganisms underscoring the microbial groups that use each as their primary basis for energy production. (1.5 marks)
- 3). List the principle differences (i.e. structure, anchoring, motion) between prokaryotic and eukaryotic flagella (3 marks)
- 4). State two other names for glycocalyx specifying any five functions associated with it in prokaryotic microorganisms (3.5 marks)
- 5). Give any three lines of evidence supporting the endosymbiotic theory in relation to the origin of eukaryotic cells (1.5 marks)
- 6). Which are the topmost taxonomic hierarchies proposed by Carl Woese (1990) and were the phylogenetic relationships in the hierarchies determined. (2.5 marks)
- 7). What are the key differences between growth curves of bacterial and viral populations? (2.5 marks)

- 8). Briefly explain how attenuation regulates RNA translation in prokaryotic cells (2.5 marks)
- 9). Giving a summarized equation highlighting the electron donor for each case, name the different autotrophic processes that prokaryotes can use to produce energy in natural ecosystems (3 marks)
- 10). List any four methods of illumination that can be used in light microscopy to improve image quality during histological observation of microorganisms (2 marks)

SECTION B

Answer any THREE questions from this section (15 marks each)

- 11). Using a well labeled diagram, describe the key differences between cell wall structure of Gram (+) and Gram (-) bacteria explaining why penicillin affect such structures in some prokaryotes but not others (15 marks).
- 12). With the aid of well labeled illustrations, write short notes on the mechanisms behind the genetic transformation of prokaryotic microbes pointing out which modes of DNA transfer are commonly exploited in genetic engineering and expounding how genetic engineering is different from natural transfer of genes (15 marks).
- 13). Give a chronological account of the key discoveries and innovations that significantly contributed towards the emergence of microbiology as a separate and critical discipline of science (15 marks).
- 14). Several physical and chemical factors affect the growth of prokaryotic microorganisms, which make manipulation of such factors a vital tool in preserving cultures of such organisms for long-term use in the laboratory or mitigating of the build-up of large populations of such organisms in certain environments. Discuss (15 marks).