UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER: 2008/2009

TITLE OF PAPER: MICROBIOLOGY AND IMMUNOLOGY

COURSE CODE: B404

TIME ALLOWED: THREE HOURS

INSTRUCTIONS:
1. ANSWER QUESTION <u>ONE</u> AND ANY <u>THREE</u> QUESTIONS
2. EACH QUESTION CARRIES TWENTY FIVE (25) MARKS
3. ILLUSTRATE YOUR ANSWERS WITH LARGE AND CLEARLY LABELLED DIAGRAMS WHERE APPROPRIATE

SPECIAL REQUIREMENTS:

NONE

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS

BEEN GRANTED BY THE INVIGILATORS

QUESTION 1

(a) Indicate the practical application of negative staining. (1 mark)

(b) Why is the Gram stain a differential staining technique? (1 mark)

(c) Separate the following bacteria into gram-positive and gram-negative organisms: *Neisseria, Bacillus, Escherichia, Salmonella, Shigella, Vibrio, Clostridium, Klebsiella, Corynebacterium, Staphylococcus, Haemophilus* and *Mycobacterium* species. (6 marks)

(d) Name one disease caused by each of the bacteria listed in (c) above. (6 marks)

(e) State the Rubner surface rule and relate it to metabolic rates of microorganisms. (1 mark)

(f) What is the role of dipicolinic acid in bacterial sporogenesis? (1 mark)

(g) Name the different methods that are employed in typing bacteria. (2 marks)

(h) Distinguish between self-infection and cross-infection. (1 mark)

(i) Define the terms: 50% infectious dose and 50% lethal dose. (1 mark)

(j) Name two mechanisms through which bacteria cause disease. (1 mark)

(k) Give a list of a generalized sequence of the stages of infection. (2 marks)

(l) Indicate whether the following grafts would be accepted or rejected by a patient:
- isograft
- autograft
- allograft
- allograft + cytotoxic drugs
- heterograft + cytotoxic drugs
- heterograft (2 marks)

[TOTAL MARKS = 25]

QUESTION 2

Write an essay on *Staphylococcus aureus* in terms of its important properties, pathogenesis, and disease prevention.

[TOTAL MARKS = 25]

QUESTION 3

a) Give a flow chart to demonstrate that the cells of the immune system originate from the bone marrow stem cell. (5 marks)

b) Indicate the role of B and T cells in specific host resistance. (15 marks)

c) Explain the concept of immune defects. (5 marks)

[TOTAL MARKS = 25]

QUESTION 4

a) What is "chemotherapeutic index"? What is its rationale in chemotherapy?

(4 marks)

b) Write an essay on the mode of action of antibiotics. (10 marks)

c) How does antibiotic resistance by bacteria arise? (5 marks)

d) Cite some examples of clinically proven drug resistance by bacteria.

(6 marks)

[TOTAL MARKS = 25]

QUESTION 5

Explain the following:

a) Viral pathogenesis (12.5 marks)

b) Malignant transformation by tumor viruses. (12.5 marks)

[TOTAL MARKS = 25]

QUESTION 6

a) Demonstrate that specific immunity arises from the cooperation of lymphocytes and macrophages. (4 marks)

b) Briefly describe the following:

    (i) complete antigen (3 marks)

    (ii) incomplete antigen (3 marks)

    (iii) partial antigen (3 marks)

c) What is an anaphylaxis? Elaborate. (5 marks)

d) Define the term "cellular immunity" (3 marks)

e) Explain how T cells react against viruses inside cells. (4 marks)

[TOTAL MARKS = 25]