



FACULTY OF SCIENCE

DEPARTMENT OF BIOTECHNOLOGY NATIONAL DIPLOMA IN BIOTECHNOLOGY

MODULE BTN2ADR
 DISEASE AND IMMUNE RESPONSE
CAMPUS DFC

JUNE EXAMINATION

DATE: 06/06/2014

SESSION: 14:00 – 16:00

ASSESSOR

MRS CA KRUGER

INTERNAL MODERATOR

MR K MACLEAN

EXTERNAL MODERATOR

DURATION 2 HOURS

MARKS 120

NUMBER OF PAGES: 5 PAGES

INSTRUCTIONS: ANSWER ALL QUESTIONS CLEARLY IN THE TEST SCRIPT PROVIDED. STUDENTS ARE REQUIRED TO HAND IN THEIR TEST AND ANSWER SCRIPTS AFTER COMPLETION OF THE EXAM.

REQUIREMENTS: 2 ANSWER SCRIPTS PER STUDENT

QUESTION 1

Give the definitions of the following terms:

- 1.1 Pathogenicity [1]
 - 1.2 Pathogen [1]
 - 1.3 Normal Microbiota [1]
 - 1.4 Immunity [1]
- [4]**
-

QUESTION 2

The two types of immunity that an invading microorganism or foreign particle could possibly encounter within the human body, is namely;

- 2.1 Non-specific immunity (or innate / natural immunity) [3]
- 2.2 Specific immunity (or acquired immunity) [3]

Briefly, discuss each type of immunity in relation to host resistance.

[6]

QUESTION 3

- 3.1 Leukocytes are white blood cells responsible for both nonspecific and specific immunity. List five different types of leukocyte cells found within the body. [2.5]
- 3.2 Lymphoid organs are those where maturation, differentiation or proliferation of lymphocytes takes place, list these five types of lymphoid organs within which these processes occur. [2.5]
- 3.3 Discuss the fate of an antigen once it has entered the body. [6]

[11]

QUESTION 4

- 4.1 Within innate immunity a process known as inflammation occurs in order for an antigen to be destroyed. Briefly describe the inflammatory process. [8]
- 4.2 Natural killer (NK) cells are phagocytic granular lymphocytes and their major function is to destroy malignant cells and cells infected with viruses. List two ways in which they recognize their targets. [2]
- 4.3 Discuss the four characteristics that distinguish specific immunity from non-specific resistance. [4]

-
- 4.4 Name and discuss the two branches of specific immunity. [4]

[18]

QUESTION 5

- 5.1 Draw the structure of an antibody / immunoglobulin molecule. [4]
- 5.2 "From a large, diverse B-cell pool, specific cells are stimulated by antigens to reproduce and form a B-cell clone whose cells contain the same genetic information." This is known as the clonal selection theory which is a hypothesis to explain immunologic specificity and memory. Diagrammatically represent this theory. [6]

[10]

QUESTION 6

- 6.1 List the three types of complement pathways that can cause lysis and cell death of pathogenic cells. [3]
- 6.2 Briefly draw and discuss how the complement pathway causes destruction of bacterial cells. [5]

[8]

QUESTION 7

- 7.1 The Major Histocompatibility Complex (MHC) plays an important role in the control of the immune system. Briefly name and discuss the roles of the three main MHC classes. [3]

[3]

QUESTION 8

- 8.1 Give the definitions of the following terms:
- 8.1.1 Acquired immune tolerance [1]
- 8.1.2 Immunological tolerance [1]
- 8.2 Briefly discuss "central tolerance" in relation to the role it mediates within the immune system. [4]

[6]

QUESTION 9

- 9.1 A vaccine is a preparation from an infectious agent that is administered to humans and other animals to induce protective immunity, there are five different types of vaccines. Briefly discuss each. [5]

- 9.2 Herd immunity (or community immunity) occurs when vaccination of a portion of the population (or herd) provides protection to unvaccinated individuals as well. Briefly discuss the “herd immunity theory”. [2]

[7]

QUESTION 10

- 10.1 Hypersensitivities are divided into four types according to the immunopathology involved. Name and briefly discuss each type in accordance to their classification. [16]

[16]

QUESTION 11

- 11.1 Discuss autoimmunity versus autoimmune disease in relation to the immune system. [4]
- 11.2 Name the four factors that influence the development of autoimmune disease. [4]
- 11.3 Briefly discuss “graft versus host disease” as an autoimmune disease in relation to transplant rejection after a recipient has received a donor organ. [4]

[12]

QUESTION 12

- 12.1 The “latex agglutination assay” is used for the detection of antibodies in various immunological testing of antigen-antibody interactions *in vitro*. Briefly draw and describe this particular method. [6]
- 12.2 Briefly describe the “double diffusion agar assay” that is used to detect antibodies in immunological assays. [4]

[10]

QUESTION 13

- 13.1 List two characteristics of an ideal antibiotic. [2]
- 13.2 Bacteria may use different resistance mechanisms to withstand the chemotherapeutic agents, list three mechanisms of antimicrobial resistance. [3]

[5]

QUESTION 14

- 14.1 Name the type of virus that causes mumps. [1]
- 14.2 Name the type of bacterium that causes tuberculosis. [1]

-
- | | | |
|------|---|------------|
| 14.3 | Name the type of fungi that causes body ringworm in humans. | [1] |
| 14.4 | Name the type of protozoan that causes African sleeping sickness. | [1] |
| | | [4] |
-

TOTAL [120]