FACULTY	HEALTH SCIENCES AND VETERINARY MEDICINE		
SCHOOL	VETERINARY MEDICINE		
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UNIVERSITY OF NAMIBIA

FIRST OPPORTUNITY EXAMINATION

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This Memo consists of **SEVEN (7)** pages including this front page

Instructions

Answer all questions and

Submit this paper with your answer booklet upon completion

SECTION A. MULTIPLE CHOICE QUESTIONS [20 MARKS]

1. Which of the following is a potent immunogen?
    a. Proteins
    b. Nucleic acids
    c. Carbohydrates
    d. Fat

2. Membrane-bound IgM molecule is a:
    a. Monomer
    b. Dimer
    c. Pentamer
    d. Tetramer

3. When an antibody from one species is injected into another species, antibody response would be produced against.
    a. Isotype
    b. Allotype
    c. idiotype
    d. Heterotype

4. B cell receptors resemble:
    a. Antibody molecules
    b. Fragment antigen binding (Fab)
    c. Fragment crystallin portion of the antibody molecule
    d. Kill B-cell hybridomas.
    e. Fuse B-lymphocytes to myeloma cells.

5. The main source of the complement components is:
    a. Hepatocytes
    b. Macrophages
    c. The epithelium of the gastrointestinal tract
    d. The epithelium of the genitourinary tract

6. The alternative pathway of the complement activation is initiated by:
    a. Antigen-antibody complexes
    b. Cell surface components
    c. Free antibodies
    d. Free antigens

7. At mucosal sites, the principal mechanism of protective immunity is provided by:
    a. Lymphocytes
    b. Antibodies
    c. Phagocytes
    d. Complement

8. The transfer on immunoglobulins via placenta is completely absent in the following animal species:
    a. Horse
    b. Dog
    c. Primate
    d. cats

9. The most important component(s) that influence naturally occurring autoimmune diseases is (are):
    a. Major histocompatibility complex (MHC)
    b. T cell receptors (TCR)
    c. B cell receptors (BCR)
    d. Complement proteins (C)

10. Of the following, which one is the most important function of the complex formed by complement components C5b,6,7,8,9?

    a. To enhance antibody production.
    b. To inhibit immune complex formation.
    c. To opsonize viruses
    d. To perforate bacterial cell membranes.

11. The aim of monoclonal antibody production is to produce cells that only secrete immunoglobulin directed against the antigen used in immunization. Which of the following hybridoma production steps is NOT correct?
    a. Immunize a mouse with antigen of choice, then remove the spleen when the mouse is making an antibody response
    b. Fuse the immune spleen cells with a myeloma tumor cell
    c. The cells are cultured in a selective medium allowing fused and non-fused cells to survive
    d. This clone (hybridoma) is an immortal producer of the desired monoclonal antibody

12. Which of the following is an agent (e.g., aluminium salts, oil-based, virosomes) often used to modify or augment the effects of a vaccine by stimulating the immune system to respond to the vaccine more vigorously, and thus providing increased immunity to a particular disease?
    a. Stimulant
    b. Antigen
    c. Adjuvant
    d. Immunogen

13. Mallein test is recommended in the diagnosis of:

    a. Strangles
    b. Brucellosis
    c. Bovine tuberculosis
    d. Cheesy gland disease

14. The process whereby neutrophils and other white blood cells are attracted to an inflammatory site is called _____.

a. Diapedesis
b. Chemotaxis
c. Margination
d. Phagocytosis
e. Infiltration

15. What type of immunity develops during convalescence from an infection?

a. Natural active immunity
b. Natural passive immunity
c. Artificial active immunity
d. Artificial passive immunity

16. How much diluent needs to be added to 0.2mL of serum to make a 1:20 dilution?

a. 19.8 mL
b. 4.0 mL
c. 3.8 mL
d. 10.0 mL

17. The inflammatory process is characterized by all the following, except:

a. Increased blood supply to the area
b. Migration of white blood cells
c. Decreased capillary permeability
d. Appearance of acute phase reactants

18. In an Ouchterlony immunodiffusion reaction with antigens 1 and 2, if crossed lines result, what does this indicate?

a. Antigens 1 and 2 are identical
b. Antigen 2 is simpler than antigen 1
c. Antigen 2 is more complex than antigen 1
d. The two antigens are unrelated

19. The earliest host response to vaccination is a(n):

a. Innate immune response
b. Memory response
c. Anamnestic response
e. Specific response

20. Which of the following scenarios would you expect to destroy the effectiveness of vaccines?

a. If they are kept in the domestic fridge
b. If they are warmed to body temperature
c. if they are exposed to direct sunlight
d. If they are exposed to fluorescent light

SECTION B: FILL IN, MATCHING AND TRUE/FALSE QUESTIONS [30 MARKS]

a. Fill in questions [10 marks]

i. Serum can be depleted of complement activity by heating to …… for …. minutes.
ii. A technique called …… was one of the first vaccination technique used
iii. The overall strength of attachment of antigen with antibody molecule is known as ……
iv. …… digestion of antibody molecule yields $F(ab)'_2$ fragment, whereas ……. digestion yields two Fab fragments
v. …… cells frequently form the first line of defence against viral infections.
vi. …… are the largest of the mucosal lymphoid tissues.
vii. Very high doses of an antigen can also induce a form of clonal anergy called ……..
viii. …….. are grafts between closely related species.

b. Matching questions [8 marks]

i. Match the type of graft in the left column with corresponding attributes in the right column (please just indicate the number in the left column and its corresponding letter in the right column. [4]

Type of graft	Attribute
1. Autograft	a. Between species
2. Isograft	b. Genetically different individuals of the same species
3. Allograft	c. Between genetically identical individuals
4. Xenograft	d. Same individual
	e. Different types of organs
	f. From one part of the body to another part of the same body

ii. Match the Brucella vaccine strain with its attributes. [4]

Vaccine strain	Attributes of the strain
1. Strain 19	a. *Brucella ovis*
2. Strain 45/20	b. Rough mutant
3. Rev. 1	c. Live attenuated
4. RB-51	d. Killed
	e. Recombinant vaccine strain
	f. Egg vaccine

c. True/False questions **[12 marks]**

1. ELISA can also be used to test fluids other than blood.
2. The capacity of an immunoglobulin to be transferred through the placenta depends on the properties of its variable region.
3. In autoimmune diseases, the major histocompatibility complex (MHC) plays an important, but not exclusive role.
4. The principal role of cell-mediated immunity is to eliminate cells infected with extra-cellular pathogens.
5. Primary immunodeficiency results from genetic or developmental defects in the immune system.
6. Transfusion reactions are a manifestation of type II hypersensitivity
7. The pathologic features of diseases caused by immune complexes reflect the site of immune complex deposition and are not determined by the cellular source of the antigen
8. All species mount a similar tuberculin reaction
9. Many tumour antigens induce tolerance in a manner similar to normal self-antigens
10. DNA vaccines are not able to induce immunity in the presence of very high titres of maternal antibodies
11. Depot adjuvants influence only the primary immune response and have little effect on secondary immune response
12. It is the animal's genes, not antigens, that determine what specific foreign substances the immune system will be able to recognize and resist.

SECTION C: SHORT ANSWER QUESTIONS. **[20 MARKS]**

Question 1. Define: [10 marks]

a. Antibody titre [2]

b. Immune surveillance theory. [4]

c. Herd immunity. [2]

d. Vaccine sterility testing. [2]

Question 2. Answer to the following short questions below. **[10 marks]**

a. Give two (2) examples of non-professional antigen-presenting cells. [2]

b. Name three (3) types of vaccines produced using recombinant DNA technique. [3]

c. Name the steps of vaccine production comprised in the downstream processing. [4]

d. Give the main difference between serum and plasma. [1]

SECTION D. STRUCTURED QUESTIONS **[50 MARKS]**

Question 1. **[10 marks]**

Name and briefly (one short sentence) describe three (3) tests used to test the final vaccine product after its production and two (2) field test for vaccines.

Question 2. **[10 marks]**

a. Advise five (5) ways of preventing disease transmission during vaccination [5]

b. Discuss how the dose and timing of the antigen (administration) influence its antigenicity [4]

c. How can one differentiate a T lymphocyte from a B lymphocyte in a blood smear? [1]

Question 3. **[10 marks]**

a. Name three (3) diseases for which a hypersensitivity test is used as a diagnostic tool and name the product used in each case [6]

b. What are the immunological functions of the spleen in domestic animals? [4]

QUESTION 4. **[10 marks]**

List the surface and internal lymphoid organs in domestic animals before puberty

QUESTION 5. **[10 marks]**

a. Define Immunoregulation and state its significance in veterinary medicine [5]

b. List five (5) components of the first immunological line of defence in the intestinal mucosa of animals. [5]

END OF PAPER