

CANDIDATE NUMBER.....



AFRICA
UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's Future"

**COLLEGE OF HEALTH, AGRICULTURE AND NATURAL
SCIENCES**
DEPARTMENT OF BIOMEDICAL AND LABORATORY SCIENCES
BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS DEGREE

NSLS406: TRANSFUSION SCIENCE AND IMMUNOLOGY

END OF SECOND SEMESTER FINAL EXAMINATIONS

APRIL/MAY 2023

LECTURER: Dr Aaron Maramba

DURATION: 3 HOURS

INSTRUCTIONS

1. Write your candidate number on the space provided on top of each page
 2. Answer **all** questions in sections A on the question paper.
 3. Answer **all** questions in section B on separate answer sheets provided.
 4. Answer any **2** questions in section C on separate answer sheets provided
 5. Credit will be given for logical, systematic and neat presentations in sections B and C
-

CANDIDATE NUMBER.....

SECTION A : MULTIPLE CHOICE [50 MARKS]

- Answer all questions by encircling the correct response T for TRUE or F for FALSE for each statement in all the questions.
- Each correct response is allocated half mark.

1. Which of the following patients is most likely going to have a positive antibody screen?

- | | | | |
|---|---|----|---|
| T | F | a) | A pregnant woman, blood group O Rh (D) positive |
| T | F | b) | Child with sickle cell disease on a regular transfusion programme |
| T | F | c) | A child with severe combined immunodeficiency disease (SCID) |
| T | F | d) | A 2-year-old boy newly diagnosed with acute lymphocytic leukaemia (ALL) |
| T | F | e) | A transfusion dependent individual |

2. Washed red blood cells are sometimes used for.

- | | | | |
|---|---|----|---|
| T | F | a) | Jehovah's witness |
| T | F | b) | IgA deficiency |
| T | F | c) | Paroxysmal Nocturnal haemoglobinuria |
| T | F | d) | Thrombotic thrombocytopenic purpura (TTP) patients |
| T | F | e) | Necrotising enterocolitis with positive lectin screen |

3. The following are pathological transfusion reactions:

- | | | | |
|---|---|----|--|
| T | F | a) | Transfusion-Associated Graft versus Host Disease (TA-GVHD) |
| T | F | b) | Transfusion-Associated circulation overload (TACO) |
| T | F | c) | Transfusion-Associated Dyspnea |
| T | F | d) | Transfusion-Associated Acute Lung Injury (TRALI) |
| T | F | e) | Haemolytic transfusion reaction |

CANDIDATE NUMBER.....

4. Which antibodies may not cause HDN?

- | | | | |
|---|---|----|-----------|
| T | F | a) | anti-A, B |
| T | F | b) | anti-M |
| T | F | c) | anti-D |
| T | F | d) | anti-ce |
| T | F | e) | anti-K |

5. ABO HDN is mild because:

- | | | | |
|---|---|----|---|
| T | F | a) | anti-AB is fairly weak at birth |
| T | F | b) | antigens are not fully developed at birth |
| T | F | c) | anti-AB is of the IgM type |
| T | F | d) | A and B substances neutralize the anti-AB |
| T | F | e) | H on O cells is weak |

6. Immediate immunological adverse effects of transfusion are:

- | | | | |
|---|---|----|------------------------------|
| T | F | a) | iron overload |
| T | F | b) | anaphylaxis |
| T | F | b) | marked fever |
| T | F | c) | urticaria |
| T | F | d) | congestive heart failure |
| T | F | e) | non-cardiac pulmonary oedema |

7. The following blood components are used for intrauterine transfusion:

- | | | | |
|---|---|----|--------------------------|
| T | F | a) | sickle negative blood |
| T | F | b) | phenotyped blood |
| T | F | c) | CMV-negative blood |
| T | F | d) | leucocyte-depleted blood |
| T | F | e) | washed platelets |

CANDIDATE NUMBER.....

8. The following are used in autologous transfusion

- | | | | |
|---|---|----|----------------------------------|
| T | F | a) | Regular donation |
| T | F | b) | Apheresis donation |
| T | F | c) | Intraoperative cell salvage |
| T | F | d) | Polymerised haemoglobins |
| T | F | e) | Acute normvolaemic haemodilution |

9. Red cell transfusion is indicated in the following conditions:

- | | | | |
|---|---|----|---------------------------------------|
| T | F | a) | immune thrombocytopenic purpura (ITP) |
| T | F | b) | Most invasive surgery |
| T | F | c) | Post partum haemorrhage |
| T | F | d) | Posterior eye surgery |
| T | F | e) | Epistaxis with haemoglobin of 120g/L |

10. The following are a source of fibrinogen in major haemorrhages

- | | | | |
|---|---|----|---------------------|
| T | F | a) | Fresh frozen plasma |
| T | F | b) | Cryoprecipitate |
| T | F | c) | NovoSeven |
| T | F | d) | Otaplas |
| T | F | e) | Albumin |

11. The following are used for neonatal exchange transfusion:

- | | | | |
|---|---|----|---|
| T | F | a) | red cells in CPD |
| T | F | b) | washed red cells |
| T | F | c) | IAT crossmatch compatible with patient plasma |
| T | F | d) | long dated blood |
| T | F | e) | irradiated red cells |

CANDIDATE NUMBER.....

12. Rhesus haemolytic disease of the newborn (HDN):

- T F a) is of mild form
- T F b) mostly has decreased in developed countries
- T F c) may also be due to anti-E
- T F d) 94% of HDN is due to anti-D
- T F e) prior immunization is required

13. Adverse transfusion reactions:

- T F a) most cannot be prevented
- T F b) always keep the intravenous line open
- T F c) stop the transfusion process immediately
- T F d) keep talking to the patient
- T F e) all reactions are immunological

14. Transfusion of Octaplas is indicated in.

- T F a) bleeding patients with deranged coagulation
- T F b) for the immediate reversal of warfarin effect
- T F c) in IgA deficient patients
- T F d) plasma exchange in TTP patients
- T F e) in anemic patients going for elective surgery

15. The following can cause transfusion transmissible infections:

- T F a) hepatitis B antibodies
- T F b) Ebola virus
- T F c) Loa loa
- T F d) H. pylori
- T F e) Syphilis antibodies

CANDIDATE NUMBER.....

16. The following blood components are regarded as special products:

- T F a) group O Rh-negative blood
 T F b) irradiated platelets
 T F c) red cells suspended in SAG-M
 T F d) Buffy cot
 T F e) HLA matched platelets

17. The following are common allergens associated with type I hypersensitivity.

- T F a) Proteins
 T F b) Bee venom
 T F c) Plant pollen
 T F d) Snake venom
 T F e) Basophils

18. Concerning transfusion in haemato-oncology

- T F a) prevention of CMV transmission by transfusion
 T F b) no red cell transfusion
 T F c) prophylactic platelet transfusion
 T F d) prophylactic anti-D for mismatched BMT
 T F e) long-term transfusion support for myelodysplasia

19. The following are examples of immunopathologies

- T F a) Inflammation
 T F b) Autoimmunity
 T F c) Refractory anaemia
 T F d) Transfusion
 T F e) immunodeficiencies

20. Which of the following are causes of cancer?

- T F a) Mutations
 T F b) Oncogenes
 T F c) Radiation
 T F d) Mitosis
 T F e) Senescence

CANDIDATE NUMBER.....

SECTION B: [25 MARKS]

Answer all questions on separate answer sheets provided.

1. List four (4) types of autologous human blood transfusion (4 marks)
2. Name the four (4) hypersensitivity types (4 marks)
3. List any five (5) types of governance for haemovigilance systems [5 Marks]
4. List any five (5) special blood products [5 marks].
5. List any three (3) special blood products given to bone marrow transplant patients [3 marks]
6. Give any four (4) potentially sensitising events in Rhesus D negative mothers [4 marks]

CANDIDATE NUMBER.....

SECTION C: [50 marks]

Answer any 2 questions from this section on separate answer sheets provided.

1. Display your knowledge of blood banking by describing the adverse effects of transfusion. [25]
- 2 a. Demonstrate your understanding of type IV hypersensitivity reactions and give one example of a clinical condition that can result from it (12.5 marks)
- b. Describe the mechanism of hypersensitivity type 1 (12.5 marks)
- 3 With the help of some examples, discuss **artificial blood substitutes** that can be used as **alternatives to red blood cells transfusion** [25 Marks].
- 4 Describe as compressively as possible the **blood manufacturer** type of haemovigilance governance system [25]
- 5 Read the case below and answer all the questions that follow.

Details of the case

Mrs. Nyabeze has the ABO blood group O, Rhesus D negative, and her husband Mr. Nyabeze has the ABO blood group A, Rhesus D positive. This couple had four children. Two of their children have been affected by hemolytic disease of the newborn (HDNB). The details are as follows:

- I. first child born 2010 – unaffected.
- II. second child born 2015 – mildly affected.
- III. third child born 2019 – seriously affected, required intrauterine blood transfusion.
- IV. fourth child born 2022 – unaffected.

In both affected cases (second and third children), the cause of the hemolytic disease was identified as antibodies to Rhesus D binding to the child's red cells. Following the second, third, and fourth deliveries, Mrs. Nyabeze was given prophylaxis against the Rhesus D.

Answer the following questions about this case:

- a) What are your deductions about the Rhesus D status of the first child? **(2 marks)**
- b) Explain why haemolytic disease of the new born (HDNB) usually become more serious with successive pregnancies? **(2 marks)**
- c) What is the reason for giving anti-Rhesus D prophylaxis to the mother? **(3 marks)**
- d) Why is prophylaxis given prenatal and sometimes postpartum? **(5 marks)**
- e) Explain why the Rhesus prophylaxis after the second delivery failed to prevent HDNB in the third child? **(2 marks)**

CANDIDATE NUMBER.....

f) Explain the fact that the fourth child is unaffected? **(3 marks)**

Assuming that the blood groups of the children are:

- I. first child – O, Rh D+;
- II. second child – B, Rh D+;
- III. third child – A, Rh D-;
- IV. fourth child – A, Rh D+

g) Explain how the third child affected by HDNB? **(4 marks)**

h) Which child might not have been fathered by Mr. Nyabeze and why? **(4 marks)**

.