



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

DEPARTMENT OF CLINICAL HEALTH SCIENCES

QUALIFICATION : BACHELOR OF MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: 08BMLS	LEVEL: 6
COURSE CODE: HAM621S	COURSE NAME: HAEMATOLOGY 2B
SESSION: NOVEMBER 2024	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION PAPER	
EXAMINER(S)	Ms EDWIG SHINGENGE
MODERATOR:	Ms BELINDA ROSELIN RTSAUSES

INSTRUCTIONS	
	<ol style="list-style-type: none">1. Answer ALL the questions.2. Write clearly and neatly.3. Number the answers clearly.4. Non-programmable calculators allowed.

THIS QUESTION PAPER CONSISTS OF 7 PAGES (Including this front page)

QUESTION 1

[10]

Evaluate the statements in each numbered section and select the most appropriate answer or phrase from the given possibilities. Write the appropriate letter next to the number of the statement/phrase.

1.1 A White Cell Count of $19.8 \times 10^9/\ell$ is within the normal range for which individual listed below?

(1)

- A) 5-year-old
- B) 5-day old infant
- C) 25-year-old male
- D) 60-year-old female

1.2 Which of the following findings is NOT a characteristic feature of myelodysplastic syndromes?

(1)

- A) Dimorphic macrocytes/normocytes
- B) Hypo lobulated neutrophils
- C) Dimorphic microcyte/normocyte picture
- D) Giant platelets

1.3 Identify an example of epigenetics:

(1)

- A) Histone modification
- B) Translocation
- C) Inversion
- D) Deletion

1.4 Secondary granules start to appear at which stage of the neutrophil maturation?

(1)

- A) Blast
- B) Band Cell
- C) Myelocyte
- D) Metamyelocyte

1.5 Which chromosome abnormality occurs in AML with RUNX1-RUNX1T1?

(1)

- A) t(8;21)
- B) t(9;22)
- C) t(15;17)
- D) t(1;19)

1.6 A 27-year-old woman presents with acute bleeding to the emergency department and is found to have a white count of $32.7 \times 10^9/L$ with pancytopenia: haematocrit 25%, platelet count $30 \times 10^9/L$, and absolute neutrophil count $0.8 \times 10^9/L$. She has a combination of 93% blasts and abnormal promyelocytes in her peripheral blood; some of these cells contain stacked Auer rods. What form of leukaemia does she most likely have? (1)

- A) Acute myeloid with t(15;17)
- B) Chronic myeloid leukemia
- C) Acute monoblastic leukemia
- D) Acute myeloid with t(8;21)

1.7 Forward light scatter is a result of: (1)

- A) Cellular size
- B) Internal components
- C) Dilution of sample
- D) Intensity of laser light

1.8 Which of the following is used to restrict the data analysis to one population? (1)

- A) Compensation
- B) Linear amplification
- C) Gating
- D) Logarithmic amplification

1.9 The French American British (FAB) classification of Acute Myeloblastic Leukaemia (AML) is based on? (1)

- A) Cytogenetic abnormalities
- B) Morphology and cytochemistry of blasts
- C) Immunophenotyping of blasts
- D) Molecular genetic abnormalities

1.10 Blood donors are normally bled to save lives of patients. However, there are some conditions that required to be bled save their own lives. Which of the following condition will this form of treatment apply to: (1)

- A) Myelofibrosis
- B) Essential Thrombocythemia
- C) Acute Myeloid Leukaemia
- D) Polycythaemia Vera

QUESTION 2**[14]**

2.1 For each of the following Myelodysplastic Syndrome (MDS) categories, suggest criteria that warranties a definite diagnosis: (14)

2.1.1 MDS with low blasts and isolated 5q deletion (MDS-5q). (2)

2.1.2 MDS with low blasts and SF3B1 mutation (MDS-SF3B1). (2)

2.1.3 MDS with biallelic TP53 inactivation. (2)

2.1.4 MDS with low blasts (MDS-LB). (2)

2.1.5 MDS with low blasts and ring sideroblasts (MDS-LB-RS). (2)

2.1.6 MDS, hypoplastic (MDS-h). (2)

2.1.7 MDS with increased blasts. (2)

SECTION B: SHORT AND LONG QUESTIONS**[41 MARKS]****QUESTION 3****[22]**

Neutrophils are primary white blood cells involved in the body's function to fight pathogens. Answer the following questions concerning these cells:

3.1 Use the following table to differentiate between primary and secondary granules (**duplicate table onto answer sheet**). (10)

	Primary Granules	Secondary Granules
3.1.1 Also Called:		
3.1.2 Stage of appearance		
3.1.3 Colour		
3.1.4 Two examples of content		

3.2 By means of a sketch, predict the white cell histogram in the following conditions. (5)

3.2.1 Normal conditions

3.2.2 Infection

3.2.3 Chronic Myeloid Leukaemia

3.2.4 Acute Myeloid Leukaemia

3.3 Briefly discuss Gaucher's disease which is a benign disorder of the monocyte? (5)

3.4 By means of the absolute count, define eosinophilia. (2)

QUESTION 4

[19]

- 4.1 Outline the FAB classification for acute myeloid leukaemia. (8)
- 4.2 The following questions are based on the subtypes you identified in question 4.1:
- 4.2.1 Which subtype is often associated with people living with down syndrome? (1)
- 4.2.2 Which subtype will be negatived with Myeloperoxidase stain: (1)
- 4.2.3 Which subtype has the tendency to infiltrate gums. (1)
- 4.2.4 Which subtype will yield a positive Periodic Acid Schiff result. (1)
- 4.2.5 Which subtype is often associated with Disseminated Intravascular Coagulation. (1)
- 4.3 Briefly describe what is meant by bone marrow cellularity and demonstrate the percentages that define hypo and hypercellularity. (4)
- 4.4 Identify at least 2 tests performed on bone marrow samples for the diagnosis of leukaemia. (2)

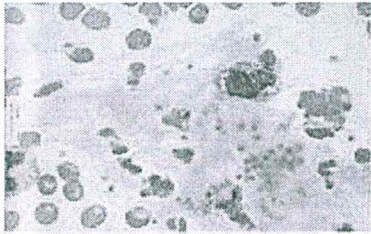
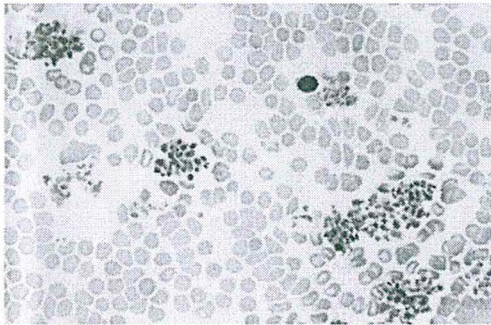
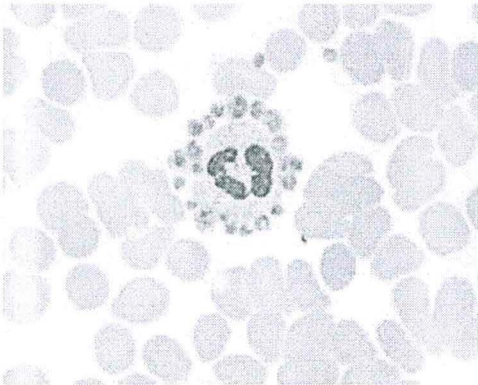
SECTION C: APPLICATION BASED

[35 MARKS]

QUESTION 5

[18]

- 5.1 What are the preliminary actions towards a patient sample with decreased platelet count. (4)
- 5.2 The following morphologies are all associated with falsely low platelet counts. Identify the morphologies and suggest how they result in low platelet counts: **(Print in colour)(Table on next page)** (6)

Marks	RBC Morphology	Morphology & Causes
A)		
B)		
C)		

5.3 The increase in red blood cells is termed as polycythaemia. Discuss the three forms of polycythaemia.

(6)

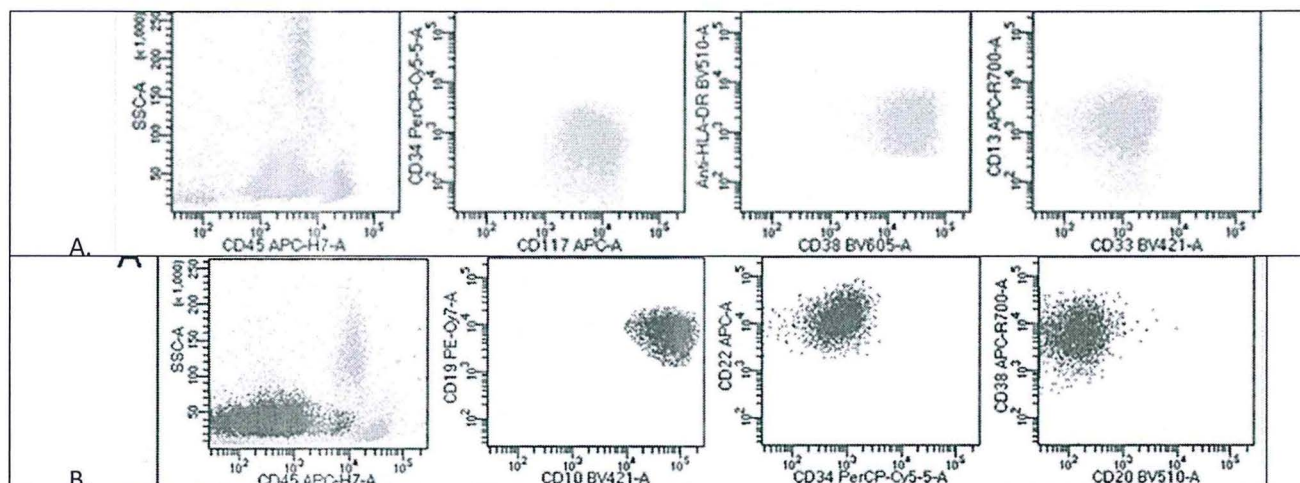
5.4 What is the importance of using Perl's Prussian Blue in Myelodysplastic Syndromes?

(2)

QUESTION 6

[17]

The following are flow cytometry results from two patients.



6.1 Interpret the results for each patient. (7)

6.2 Based on the immunophenotype results, predict the type of leukaemia that each patient could be suffering from and explain your answer. (4)

6.3 The CD34 marker is known as an aberrant marker, what does this mean? (2)

6.4 What is the importance of the CD45 marker? (2)

6.5 Briefly explain the principle of immunophenotyping. (2)

THE END [100 MARKS TOTAL]