namibia university
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

DEPARTMENT OF HEALTH SCIENCES

QUALIFICATION : MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: 08BMLS	**LEVEL:** 6
COURSE CODE: HAM611S	**COURSE NAME:** HAEMATOLOGY 2A
SESSION: JUNE 2022	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION PAPER	
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INSTRUCTIONS
1. Answer ALL the questions.
2. Write clearly and neatly.
3. Number the answers clearly.

THIS QUESTION PAPER CONSISTS OF 8 PAGES (Including this front page)

SECTION A (20 MARKS)

QUESTION 1

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   The bone marrow becomes the sole site of haemopoiesis as from…..

(1)

A)   5 months foetal life
B)   6 months foetal life
C)   5 months neonatal life
D)   6 months neonatal life

1.2   Which of the following cells arise from the myeloid progenitor cell?

(1)

A)   Erythrocytes, Lymphocytes, Monocytes, Neutrophils
B)   Erythrocytes, Natural Killer Cells, Megakaryocytes, Neutrophils
C)   Erythrocytes, Monocytes, Megakaryocytes, Neutrophils
D)   Eosinophils, Monocytes, Lymphocytes, Neutrophiles

1.3   14- 25um big, with 1:8 N:C ratio, 1-2 nucleoli, deep blue cytoplasm, describes a:

(1)

A)   Reticulocyte
B)   Normoblast
C)   Early erythroblast
D)   Late erythroblast

1.4   Ineffective erythropoiesis is characterized by:

(1)

A)   Increased reticulocytes with decreased bilirubin
B)   Increased reticulocytes with increased bilirubin
C)   Decreased reticulocytes with increased bilirubin
D)   Decreased reticulocytes with decreased bilirubin

1.5   Identify the correct erythrocyte to myeloid ratio.

(1)

A)   1:1
B)   2:1
C)   1:4
D)   4:1

1.6   Identify the nutrient that acts as a co-enzyme in heme synthesis.   (1)

   A)   Vitamin B6
   B)   Vitamin B12
   C)   Erythropoietin
   D)   Iron

1.7   What is the normal maturation time for a reticulocyte to erythrocyte?   (1)

   A)   23 days
   B)   2-3 days
   C)   1 day
   D)   120 days

1.8   A defect in which of the following pathways give rise to Heinz bodies?   (1)

   A)   Embden Meyerhof Pathway
   B)   Methaemoglobin Pathway
   C)   Hexose monophosphate Pathway
   D)   Leubering Rappaport Pathway

1.9   A high Mean Cell Haemoglobin Concentration is consistent with which of the   (1)
       following morphologies.

   A)   Spherocytes
   B)   Microcyte
   C)   Macrocyte
   D)   Target cell

1.10   Identify the red cell morphology consistent with microangiopathic haemolytic anaemia.   (1)

   A)   Spherocyte
   B)   Sickle cell
   C)   Burr cell
   D)   Schistocyte

QUESTION 2   [10]

For each of the following phrases, suggest the appropriate technical/scientific term

2.1   Blood cell production   (1)

2.2   The location of haematopoietic stem cells in an embryo   (1)

2.3   Cytokines that regulate the proliferation and differentiation of progenitor cells   (1)

2.4   Main site of erythropoietin production   (1)

2.5   The primary stimulant of increased erythropoietin production   (1)

2.6   A type of haemoglobin composed of 2 alpha and 2 delta chains   (1)

2.7   The most abundant peripheral protein in a red cell membrane   (1)

2.8   When first oxygen molecule binds, it attracts other oxygen molecules   (1)

2.9   The metabolic pathway that produces the majority of the red cell haemoglobin   (1)

2.10   The cationic dye part of the Romanowsky routine stain   (1)

SECTION B (48 MARKS)

QUESTION 3   [8]

3.1   What does the oxygen dissociation curve tell us?   (2)

3.2   Explain the partial oxygen pressure at the tissues and how this affects the state of the haemoglobin molecule   (2)

3.3   Indicate whether the following molecules will be decreased or increased during the different shifts (left or right) of the oxygen dissociation curve (1/2 mark for each)   (4)

	Left Shift	Right Shift
CO_2		
pH		
2.3 DPG		
Temperature		

QUESTION 4 [20]

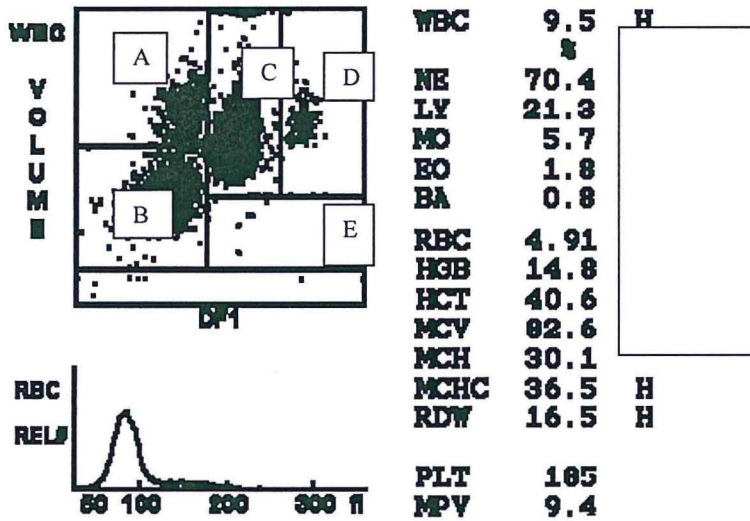Evaluate the following Full Blood Count results and answer the following questions:

WBC	9.5	H
	%	
NE	70.4	
LY	21.3	
MO	5.7	
EO	1.8	
BA	0.8	
RBC	4.91	
HGB	14.8	
HCT	40.6	
MCV	82.6	
MCH	30.1	
MCHC	36.5	H
RDW	16.5	H
PLT	185	
MPV	9.4	

Figure 1

4.1 Provide the units for the following parameters:
Red cell count, white cell count, haemoglobin, haematocrit, and mean platelet volume. (5)

4.2 Calculate the absolute values for all the different types of white cells. (5)

4.3 Label the different sections of the scatterplot with the appropriate. (5)

4.4 Explain how the machine generates the differential white cell count. (3)

4.5 Predict the red cell morphology. (2)

QUESTION 5 [20]

Examine the following peripheral blood smear picture and answer the questions that follows:
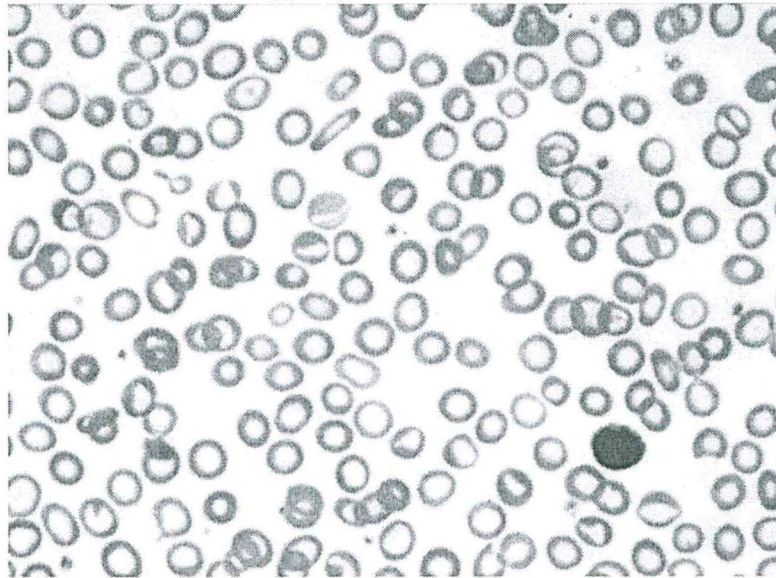
5.1 Which red cell morphology is depicted by the image (2)

5.2. Following the example, identify 4 types of anaemias that can be classified under the blood picture. Use the table below to predict the expectant tests results in each of the anaemias identified. (12)

	Serum Iron	TIBC	Ferritin	Unique Test
e.g. Iron Def Anaemia	Low	Elevated	Low	Low iron stores

5.3 What does the Total iron binding capacity tell us? (2)

5.4 In which form is iron stored in the bone marrow and how can one evaluate this? Briefly explain test principle (4)

SECTION C (32 MARKS)

QUESTION 6

[22]

A 23yr old lady has been admitted with abdominal pain, but was noted to have Haemoglobin 9dg/L, elevated LDH of 600U/L and low haptoglobin and a negative direct antiglobulin test.

6.1 Diagnose the anaemia and support your answer. (3)

6.2 Explain the principle of the Direct Antiglobulin Test and its importance in diagnosing the above disorder? (5)

6.3. Classify the type of anaemia that would yield a positive DAT test. (5)

6.4 The definite diagnosis for this patient was found to be Paroxysmal Nocturnal Haemoglobinuria. What extra tests lead to theses diagnosis and where their results? (9)

QUESTION 7

[10]

Maria loves to travel to the north during rainy season to assist her aging parents with ploughing the mahangu fields. Upon her arrival from such a trip, Maria started to feel rather malaise. She had fever, chills, body aches and a nonstop headache. Maria immediately reported to the hospital. The peripheral thin and thick smear revealed the following blood picture with marked polychromasia.
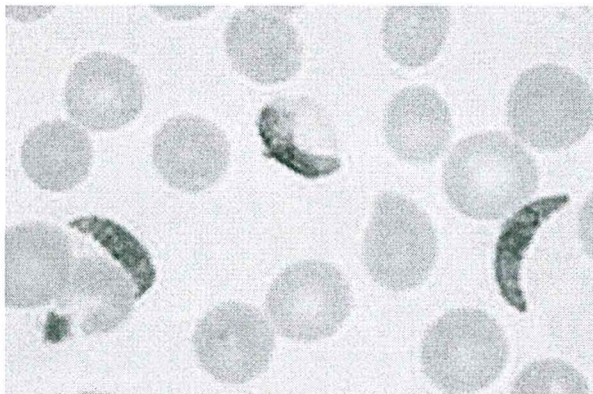
7.1 What is the most likely diagnosis? (1)

7.2 What is the most likely causative organism, explain your answer. (3)

7.3 Which two white cells would be increased in this case? (2)

7.4 Provide a reason for the polychromasia seen on the peripheral smear. (2)

7.5   Name ways in which Maria could have prevented herself from being sick while visiting her   (2)
parents.

END OF PAPER (TOTAL 100 MARKS)