NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

SCHOOL OF HEALTH SCIENCES

DEPARTMENT OF CLINICAL HEALTH SCIENCES

QUALIFICATION : MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: 08BMLS	**LEVEL:** 6
COURSE CODE: HAM611S	**COURSE NAME:** HAEMATOLOGY 2A
SESSION: JULY 2023	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	**Ms EDWIG HAUWANGA**
MODERATOR:	**Dr ELZABE VAN DER COLF**

INSTRUCTIONS
1. Answer ALL the questions. 2. Write clearly and neatly. 3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. Calculator

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

SECTION A (20 MARKS)

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 on your answer sheet.

1.1 The first sign of haemopoiesis in a foetus is observed in the? (1)

A) Liver
B) AGM region
C) Spleen
D) Bone marrow

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, Neutrophil
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 The following are all regarded as regulators of haemopoiesis except. (1)

A) Growth factors
B) Transcription factors
C) Apoptosis
D) Metabolic pathways

(1)

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

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

(1)

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

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

(1)

1.8 Identify the metabolic pathway responsible for producing 2,3DPG?

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

(1)

1.9 Which of the following would cause a dimorphic red cell curve with an increased Red Cell Distribution Width (RDW)?

A) Bone Marrow Transplant in Aplastic Anaemia
B) Thalassaemia Trait
C) A crisis during Sickle cell Anaemia
D) Transfused iron deficiency anaemia

(1)

1.10 Identify the red cell morphology consistent with microangiopathic haemolytic anaemia

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 The enzyme used in the production of NADPH to protect red cell from oxidative stress. (1)

2.2 Morphological cell shrinkage, a homogeneously glassy appearance of the nucleus, cytoplasmic condensation around the nuclear membrane and indentations in the nucleus best describes. (1)

2.3 A high rate of proliferation with low rate of differentiation and high rate of apoptosis best describes. (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 The globin chains of the haemoglobin molecule is produced in the... (1)

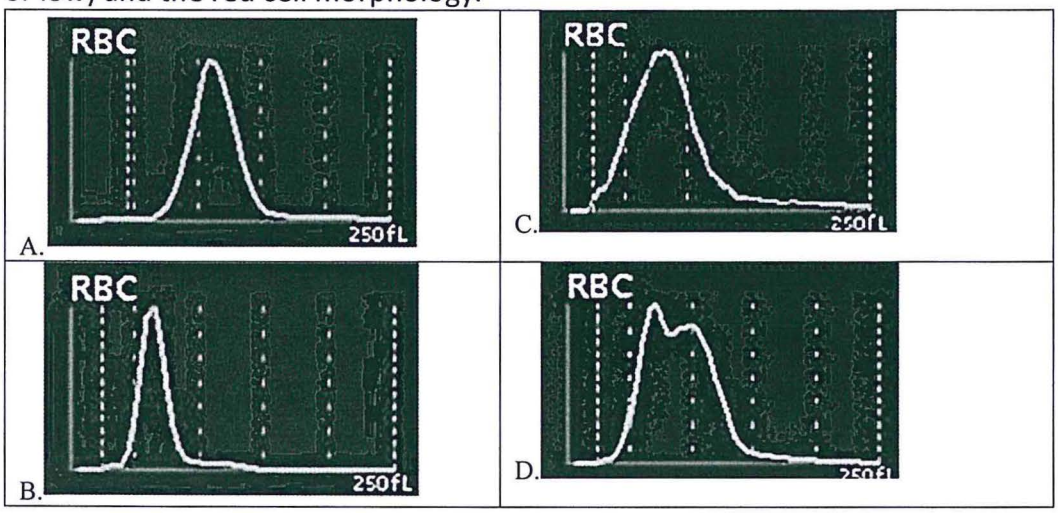
2.9 The metabolic pathway that produces the majority of the red cell's energy (ATP). (1)

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

SECTION B (43 MARKS)

QUESTION 3 [23]

3.1 For each of the following red cell histograms, predict the RDW values (normal, high or low) and the red cell morphology. (8)



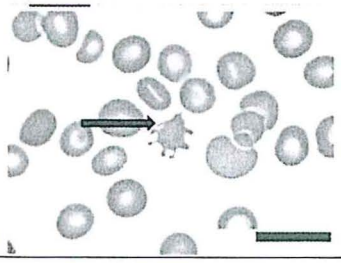
3.2 How is the RDW derived? (6)

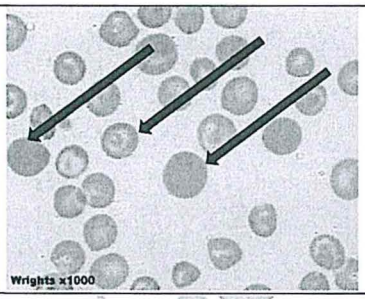
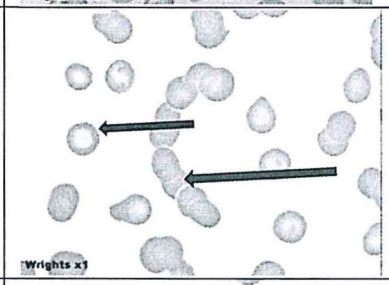
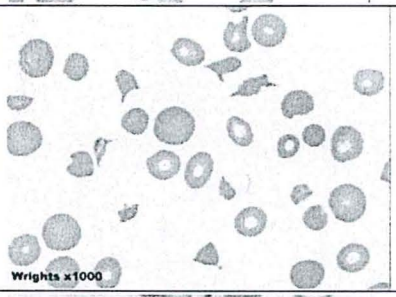
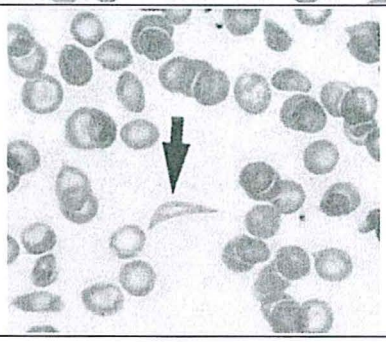
3.3 Briefly explain how bone marrow sampling takes place in a hospital. (5)

3.4 What is the responsibility of a Medical Scientist during a bone marrow sampling procedure? (4)

QUESTION 4 [20]

4.1 Examine the following red cell abnormalities and fill in the table by assigning their names and the mechanisms by which they are produced. Write only the number, abnormality and mechanism. (10)

Number	Morphology	Abnormality	Mechanism
4.1.1			

4.1.2			
4.1.3			
4.1.4			
4.1.5			

(10)

4.2 Complete the following table by indicating what will the expected results for each laboratory test in the following disorders. Copy the table in your answer sheet and complete it by indicating low, high or normal for each condition.

		Sickle cell Anaemia	Iron Deficiency	Anaemia of Chronic Disease	Thalassaemia Major	Sideroblastic anaemia
4.2.1	Serum iron					
4.2.2	Transferrin					
4.2.3	Ferritin					
4.2.4	HB electrophoresis					

½ mark per answer

SECTION C (37 MARKS) [20]

QUESTION 5

Haemoglobinopathies are a group of genetic disorders that result in a defect in the haemoglobin molecule. (2)

5.1 Identify the haemoglobinopathies associated with the following mutations linked to the haemoglobin globin chains.

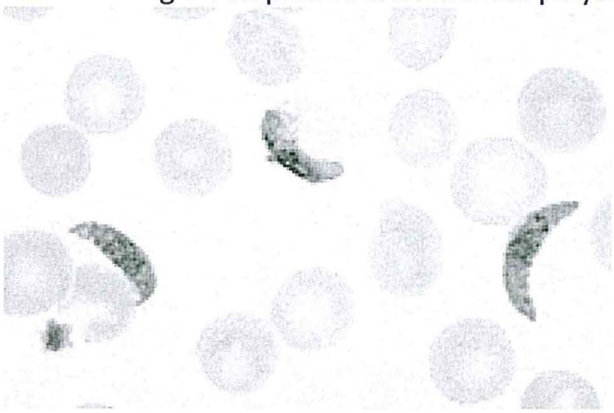
A- βo
B- -a/-- (10)

5.2. For each of the haemoglobinopathies in 5.1, give a brief pathogenesis. (8)

5.3 Draw and label expected haemoglobin electrophoresis results in both? **[10]**

QUESTION 6

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 (print in colour).



6.1 What is the most likely diagnosis? (1)

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

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

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

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

QUESTION 7 [7]

Paroxysmal Nocturnal Haemoglobinuria is a Rare, acquired clonal disorder of marrow stem cells that can be classified either as a haemolytic or aplastic anaemia.

7.1 Explain the laboratory diagnosis of this condition. (7)

END OF PAPER (TOTAL 100 MARKS)