NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF HEALTH SCIENCES

QUALIFICATION : BACHELOR OF MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: 08BMLS	**LEVEL:** 7
COURSE CODE: HAM711S	**COURSE NAME:** HAEMATOLOGY 3
SESSION: JULY 2019	**PAPER:** THEORY
DURATION: 2 HOURS 30 MINUTES	**MARKS:** 140

Supplementary / Second Opportunity Examination Question Paper	
EXAMINER(S)	Mr Maurice Nyambuya
MODERATOR:	Dr Aaron Maramba

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

PERMISSIBLE MATERIALS

1. Pen
2. Calculator

THIS QUESTION PAPER CONSISTS OF 6 PAGES (Including this front page)

SECTION A (60 MARKS)

QUESTION 1

Read the following and decide if the statement is **CORRECT** or **INCORRECT** **[10]**

1.1 High quality blood smears can be made from EDTA tubes as long as they are made within 8-24 hours on a sample stored at room temperature. (1)

1.2 Pseudothrombocytopaenia can complicate accurate determination of platelet count on a patient with an underlying platelet disorder. (1)

1.3 Elevated LDH and elevated isolated direct bilirubin confirm the presence of haemolysis. (1)

1.4 HAM's test is carried out to establish the diagnosis of paroxysmal nocturnal haemoglobinuria. (1)

1.5 A small portion of the iron in the body is contained in circulating haemoglobin. (1)

Answer all questions below. Choose the best correct answer.

1.6 Reticulocytes can only be confirmed and enumerated by employing the following stains: (1)

a) Brilliant cresyl blue
b) Wrights stain
c) May Grunewald Giemsa stain
d) New methylene blue
e) A and D

1.7 Erythropoiesis can be assessed by examining: (1)

a) The bone marrow
b) The haemoglobin level
c) The ferritin levels
d) The reticulocyte count
e) A and D

1.8 Hepcidin is a large polypeptide hormone. It has different isoforms which are; (1)

a) 20 amino acids long
b) 25 amino acids long
c) 22 amino acids long
d) 21 amino acids long
e) A and C

1.9 Pernicious Anaemia is caused by a lack of intrinsic factor which could be due to: (1)

a) Vit B12 deficiency
b) Stomach atrophy
c) Folate deficiency

d) Megaloblastic anaemia
e) Acute blood loss

1.10 Which of the following would cause a dimorphic red cell curve with an increased RDW? (1)

a) Aplastic anaemia
b) Thalassaemia trait
c) Sickle cell anaemia
d) Transfused iron deficiency
e) Multiple myeloma

[25]

QUESTION 2

A patient presented to the hospital with chronic fatigue. A bone marrow biopsy was performed, and cytogenetic testing showed a Philadelphia Chromosome.

2.1 What type of leukaemia does this patient have? Explain what hybrid gene is formed in this disease and how it causes the transformation of the cell into a malignant clone. (5)

2.2 Patients suffering from acute leukaemia usually suffer from infection, fatigue, shortness of breath, bruising and bleeding. Explain why they suffer from these symptoms. (5)

2.3 By means of a table, highlight the difference between multiple myeloma and Waldenstrom's macroglobulinemia. (15)

QUESTION 3

[25]

3.1 Define primary and secondary haemostasis and list **five** causes of thrombocytopaenia. (8)

3.2 A 24-year-old woman presented to her primary-care physician for evaluation of new tea-coloured urine noticed over the past five days. She had no history of renal stones, weight loss, night sweats or fever. Her vital signs were unremarkable. On initial evaluation, FBC, urinalysis, and renal ultrasound were normal and urine pregnancy test was negative. A few days later, she developed jaundice and urine analysis showed haemoglobinuria. Repeat testing at that time showed the following;

WBC	3.6×10^{9}/l
RBC	3.0×10^{12}/l
Hb	9.0/dl
HCT	27 %
MCV	90
MCH	30
MCHC	33.3
RDW	13 %
Plt	120×10^{9}/l
Reticulocyte count	10.9 %

Total serum bilirubin 7.5 mg/dL (ref range: 0.10-1.2 mg/dL)
Serum LDH 1500 U/L (ref range: 259-613 U/L)
Direct Coombs test was negative

From the above results comment on the expected red cell morphology (2)

3.3 Classify this anaemia, motivate your answer and explain why the physician requested a Direct Coombs test? (5)

3.4 Propose a possible diagnosis for this patient and give reasons for you answer. (2)

3.5 Suggest **three** tests that could be used to confirm the diagnosis (3)

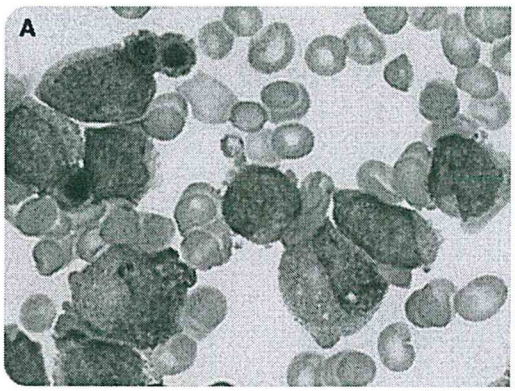
3.6 Define intravascular haemolysis and describe how it affects both urine and blood constituents. (5)

SECTION B (80 MARKS)

QUESTION 4 **[15]**

A 7 year old boy from Outapi was admitted a week ago to Lady Pohamba hospital for a haematological examination. There was no history of any haematological disorder. The patient had been suffering from recurrent febrile episodes and nocturnal sweats with weakness and fatigue. On examination; the patient looked pallor with splenic enlargement, measuring 23 cm in ultrasonography. The results were as follows;

Peripheral blood smear



Full blood count

RBC	3.14 x 10^6/µl
WBC	3.6 x 10^3/µl
Hematocrit	43 %
Hemoglobin	12.4 g/dl
MCV	99.4 fl
MCH	38.7 pg
MCHC	34.7 g/dl
RDW	13.1%
Platelets	86 x 10^3/µl

Diff count

Eosinophils	5%
Lymphocytes	62%
Neutrophils	31%
Monocytes	10%
Bands	1%

Immunophenotyping
CD13+, CD33+, CD41+, CD42+ and CD61+
CD3-, CD5-, CD7-, CD20-, CD22-, CD19-HLA-DR-
No BM analysis could be done due to dry tap effect

4.1 What is the most likely diagnosis? Motivate your answer (10)

4.2 What additional test would you do to confirm this diagnosis? (5)

QUESTION 5

[25]

5.1 Identify the AML best described by each of the following FAB and WHO descriptions: (15)

a	Central nervous system involvement, Slide: increased eosinophils, hypersegmented with large abnormal granules, blasts with/out Auer rods, monocytes increased, SB/ MPO >3% +, CD33+, CD13+, MPO+, CD11b+, FISH/PCR: Inv(16;16).
b	Slide: Blasts are pleomorphic, Bizarre platelets, bare nuclei, micro-megakaryoblasts, Dry tap: fibrosis, MPO, SB –, CD41, CD42, CD61
c	Without maturation, hepatosplenomegaly, Slide: increased myeloblasts, Auer rods +/-, monocytes <1%, ≥3% + with SB or MPO, Immunophenotyping: CD117, MPD
d	CNS involvement, Slide: Monocytes + Promonocytes (25 -75%), MPO –, CD11b, Increased muramidase
e	Predominant erythroid features, hepatomegaly , Slide: increased in both myeloid and erythroid precursors, BM: erythroblasts >50% of all nucleated cells, Iron laden mitochondria and ferritin molecules with electron microscopy, CD13+, CD33+, + transferrin receptor

5.2 Describe the pathophysiology of the abnormal haemoglobin S? (4)

5.3 Explain how the red cell indices (MCV, MCH and MCHC) are measured or calculated by automated cell counters. (6)

QUESTION 6

A 20-year-old male was referred to Katutura Hospital for profound macrocytic anemia. He was attended to in the Hematology ward where it was established that he had no history of nor active peptic ulcer. Blood was drawn for FBC, Reticulocyte count and differential and the results were as follows: **[19]**

FBC	Patient	Normal
RBC	1.14 x 10^6/µl	4.7-6.1 x 10^6/µl
WBC	3.6 x 10^3/µl	4.8-10.9/µl
Hematocrit	12.7%	42-52%
Hemoglobin	4.4 g/dl	14-18 g/dl
MCV	111.4 fl l	80-97 fl
MCH	38.7 pg	27-31 pg
MCHC	34.7 g/dl	33-37 g/dl
RDW	22.1%	11.5-14.5%
Platelets	76 x 10^3/µl	130-400 x 10^3/µl
MPV	9.3 fl	7.4-10.4 fl
Reticulocyte count:	**Patient**	**Normal**
Reticulocytes	2.6%	0.5-1.5%
Retic, Absolute	29.0 x 10^3/µl	22.5-88.5 x 10^3/µl
Retic, Corrected	0.7%	0.4-1.7%
B12/Folate Studies:	**Patient**	**Normal**
B12	<100 pg/ml	200-950 pg/ml
Folate	12.7 ng/ml	3.7-19.0 ng/ml

6.1 Make a diagnosis based on the above laboratory results. (1)

6.2 Describe and discuss the pathogenesis of this disorder. You may use figures to assist/support your description (18)

QUESTION 7 **[16]**

By means of a short essay, explain the varying roles of thrombin during injury or inflammation

Total 140 MARKS

Good luck!!!