



NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY
FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES
DEPARTMENT OF HEALTH SCIENCES

QUALIFICATION : BACHELOR OF MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: 08BMLS	LEVEL: 7
COURSE CODE: HAM711S	COURSE NAME: HAEMATOLOGY 3
SESSION: JUNE 2022	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

First Opportunity Examination	
EXAMINER(S)	Dr Maurice Nyambuya
MODERATOR:	Dr Aaron Maramba

INSTRUCTIONS
<ol style="list-style-type: none">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 7 PAGES (Including this front page)

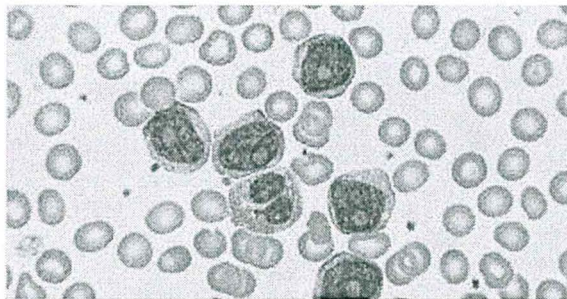
SECTION A (60 MARKS)

QUESTION 1

Answer all the following multiple questions and select the best suitable answer.

[15]

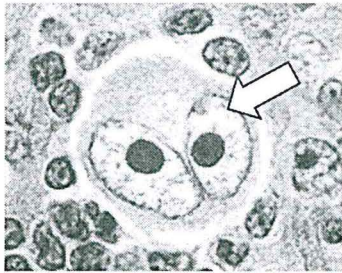
- 1.1 The typical immunophenotype of CLL/ SLL tumour cells includes: (1)
- a) Bright expression of surface Ig and B- cell markers, along with positivity for CD5 and CD23
 - b) Dim expression of surface Ig and B- cell markers, along with positivity for CD5 and CD23
 - c) CD10, CD20 and CD5 positivity
 - d) Cyclin D1, CD20 and CD5 positivity
- 1.2 Which of the following imparts a poor prognosis for patients with CLL/SLL? (1)
- a) CD38 negativity
 - b) ZAP- 70 negativity
 - c) Presence of deletion 13q
 - d) Presence of trisomy 12
- 1.3 A 60-year-old man presented with weight loss and fatigue. Examination of complete blood counts showed anaemia and leucocytosis, peripheral smear shows >55% of the cells having the morphology (in picture). Which of the following is the correct statement regarding this condition? (1)



- a) On immunophenotyping the cells strongly express surface IgM and IgD.
 - b) CD 5 and CD 23 are positive in 100 % cases
 - c) ZAP 70 and CD 38 are always negative
 - d) All are true
- 1.4 A distinct feature seen in hairy cell leukaemia but not in hairy cell variant leukaemia is: (1)
- a) Splenomegaly
 - b) Circulating neoplastic lymphocytes in the peripheral blood
 - c) Pancytopenia
 - d) Prominent nucleoli

- 1.5 Tartrate resistant alkaline phosphatase (TRAP) positivity is seen in all of the conditions except (1)
- a) Gaucher disease
 - b) Hodgkins lymphoma
 - c) Osteoporosis
 - d) Osteoclastoma

- 1.6 The following cell was seen on the bone marrow biopsy of a patient who presented with lymphadenopathy, night sweats and who had recently had Epstein Barr virus infection. What is the cell called? (1)



- a) Megakaryocyte
 - b) Burkitt's lymphoma cell
 - c) Reed-Sternberg cell
 - d) Lacunar cell
- 1.7 What disorder is characterised by the above cell? (1)
- a) Non-Hodgkin's lymphoma
 - b) Hodgkin's lymphoma
 - c) Burkitt's lymphoma
 - d) Acute myeloid leukaemia
- 1.8 A definition of the dense tubular system of the platelet would be (1)
- a) A system which is important to allow entry of substances not platelet.
 - b) A storage site for calcium
 - c) A storage site for von Willebrand factor, fibrinogen and immunoglobulin
 - d) Microtubules which support the plasma membrane
- 1.9 In the maturation of the megakaryocyte. (1)
- a) The cell becomes polyploidy
 - b) The nucleus matures before the cytoplasm
 - c) The process takes 7 days
 - d) All of the above
- 1.10 What is needed to initiate fibrinolysis? (1)
- a) Tissue plasminogen activator must bind to fibrinogen
 - b) Thrombin must bind to fibrin and cleave peptide bonds to form fibrin degradation

- products
- c) Tissue plasminogen activator must bind to fibrin and convert plasminogen to plasmin
- d) Degradation products D and E increase in circulation
- 1.11 A definition of haemostasis (1)
- a) The process of maintaining body temperature
- b) The regulation of kidney function
- c) A balanced process which maintains blood flow and prevents blood loss
- d) A balanced process which stimulates clot formation
- 1.12 Hodgkin's lymphoma is associated with the Epstein Barr virus. Which of the following would be a characteristic of malignant cell affected by the virus? (1)
- a) Chromosome 14 abnormalities
- b) CD15 and CD30 positivity using immunohistochemistry
- c) Numerous Hodgkin's mononuclear cells
- d) LMP1 positivity using immunohistochemistry
- 1.13 Primary haemostasis involves the following; (1)
- a) Factor VII, Tissue factor and Calcium
- b) Thrombin, Fibrinogen and Pro-thrombin
- c) Platelets, Endothelial cells and vessel wall
- d) Endothelial cells, Factor XII and Fibrin
- 1.14 How do endothelial cells prevent abnormal clotting? (1)
- a) The secretion of Tissue factor
- b) The expression of adhesion molecules on the surface of the cells
- c) The exposure of collagen and the secretion of plasminogen activator
- d) A negative charge and the secretion of nitric oxide
- 1.15 What is the action of Aspirin on the platelets? (1)
- a) Inhibits the action of cyclo-oxygenase
- b) Interferes with platelet aggregation by preventing shape changes
- c) Inhibits the release of alpha granule contents
- d) Stimulates fibrinolysis

QUESTION 2

[20]

- 2.1 Immature B-cell neoplasms are broadly categorised as otherwise not specified or with recurrent genetic abnormalities. List **any three (3)** categories that fall into the "with recurrent genetic abnormalities" group discuss the cytogenetic abnormality. (12)

- 2.2 There are **4 major tests** used to reflect abnormal serum proteins, especially in diagnosing plasma cell neoplasms. Name and briefly describe the rationale behind **any two (2)** tests. (4)
- 2.3 Patients suffering from acute leukaemia usually suffer from infection, fatigue, shortness of breath, bruising and bleeding. Explain why they suffer from these symptoms (4)

QUESTION 3

[25]

- 3.1 By means of a table, highlight the difference between Multiple myeloma and Waldenstrom's macroglobulinemia. (15)
- 3.2 Define primary and secondary haemostasis and **briefly** discuss the function of each. (4)
- 3.3 Describe the pathogenesis of thrombasthaenia (Glanzmann's Disease). (6)

SECTION B (40 MARKS)

QUESTION 4

[15]

A 50-year-old male presented with recurrent spontaneous and trauma-induced hemarthroses in both the ankles and knees, episodes of gastrointestinal and soft tissue bleeding, and bleeding with dental procedures. Coagulation tests were ordered and his results were as follows.

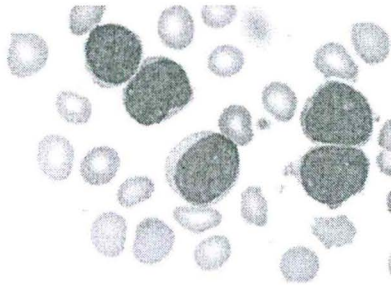
Test	Patients results	Reference range
APTT	61.2 s	24-30 s
INR	1.04	0.9-1.1
Factor VIII	50%	55-180%
% von Willebrand antigen	16%	50-200%
Ristocetin cofactor	<12	50%-200%
Von Willebrand multimer test	Plasma vWF multimers barely detectable, but a distribution normal range of multimer sizes appears to be present.	Normal size and distribution

- 4.1 What is this patient's most likely diagnosis? Explain your answer (8)
- 4.2 Outline the pathophysiology of the other major subtypes of this condition. (4)
- 4.3 Briefly discuss the treatment options for these subtypes. (3)

QUESTION 5

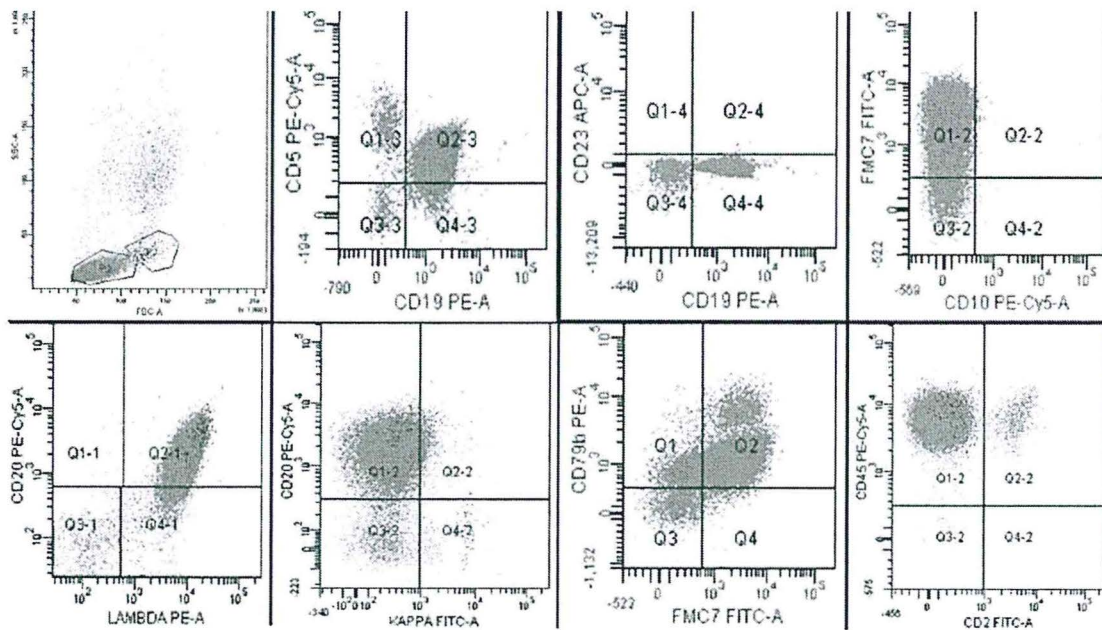
[25]

A 60-year-old woman was admitted with complaints about shortness of breath, dizziness, and episodes of palpitations after minimal physical exertion, general weakness, and increased fatigue. Upon physical examination, she had lymphadenopathy, splenomegaly, and hepatomegaly. Her **peripheral blood** was drawn, and the blood smear and **CBC** are shown below.



Complete blood count	
White Cell Count	20.6 x 10 ⁹ /l
Red Cell Count	3.2 x 10 ¹² /l
Haemoglobin	9.8 g/dl
Platelets	285 x 10 ⁹ /l

Flow cytometry was ordered to further narrow the diagnosis and the plots are shown below.



- 5.1 Comment on **any two (2)** abnormal features on the peripheral blood smear. (2)
- 5.2 Describe the characteristic immunophenotype of the cells analysed by flow cytometry. (11)
- 5.3 Based on all the information provided above, suggest the most appropriate diagnosis (2)

5.4 Which karyotype is associated with this malignancy? (2)

5.5 Describe how the abnormality in 5.4 drives the pathogenesis of this disorder. (8)

Total [100 marks]