

PAMIBIA 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: 6
COURSE CODE: HAM621S	COURSE NAME: HAEMATOLOGY 2B
SESSION: NOVEMBER 2019	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION PAPER	
EXAMINER(S)	MAURICE NYAMBUYA
MODERATOR:	ELZABE VAN DER COLF

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 5 PAGES (including this front page)

SECTION A [40]

QUESTION 1

[10]

Identify the AML using FAB classification best described by each of the following FAB/WHO descriptions below: (Two marks for each correct answer)

A	Slide: increased eosinophils, hypersegmented with large abnormal granules, blasts with/out Auer rods, monocytes increased, SB/ MPO >3% +, CD33 ⁺ , CD13 ⁺ , 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	Slide: increased myeloblasts, Auer rods +/-, monocytes <1%, ≥3% + with SB or MPO, Immunophenotyping: CD117 ⁺ , MPD
D	Slide: Monocytes + Promonocytes (25 -75%), MPO -, CD11b ⁺ , Increased muramidase
E	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

QUESTION 2

[15]

- 2.1 Define a leukaemoid reaction and its causes. (3)
- 2.2 Tabulate the 6 differences between a leukaemoid reaction and chronic myeloid leukaemia (CML). (12)

QUESTION 3

[15]

- 3.1 Describe the principal of flow cytometry. (10)
- 3.2 List 4 reasons why immunophenotyping is carried out in haematology. (4)
- 3.3 Name another common principle employed by automated instruments in counting cells in haematology apart from flow cytometry. (1)

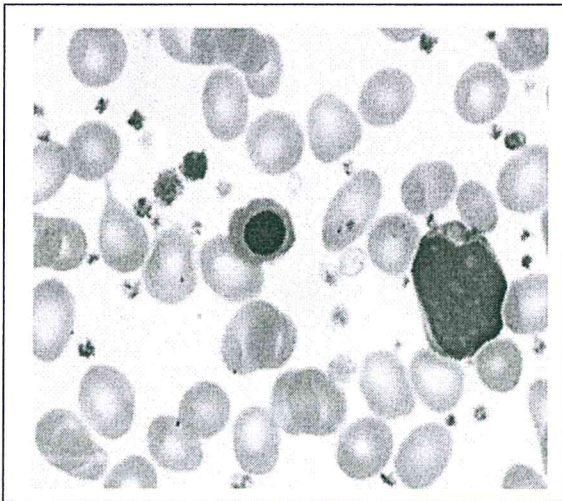
SECTION B [60]

QUESTION 4

[25]

A 69-year-old man had been complaining of progressive tiredness for many months. Recently he had noticed that he was bruising easily and was experiencing night sweats. A physical examination by the doctor revealed that he had hypertension, a slight fever and an enlarged spleen. An ultrasound revealed an enlarged liver and full blood count, differential count and bone marrow biopsy were requested.

Peripheral blood smear



Differential count

	Absolute count
Neutrophils	37
Band cells	14
Metamyelocytes	9
Myelocytes	10
Promyelocytes	1
Eosinophils	2
Basophils	2
Lymphocytes	21
Monocytes	2
Blasts	2
Nucleated RBCs	17%

Full blood count

White Cell Count	18.6	$\times 10^9/l$
Red Cell Count	3.2	$\times 10^{12}/l$
Haemoglobin	9.8	g/dl
Platelets	650	$\times 10^9/l$

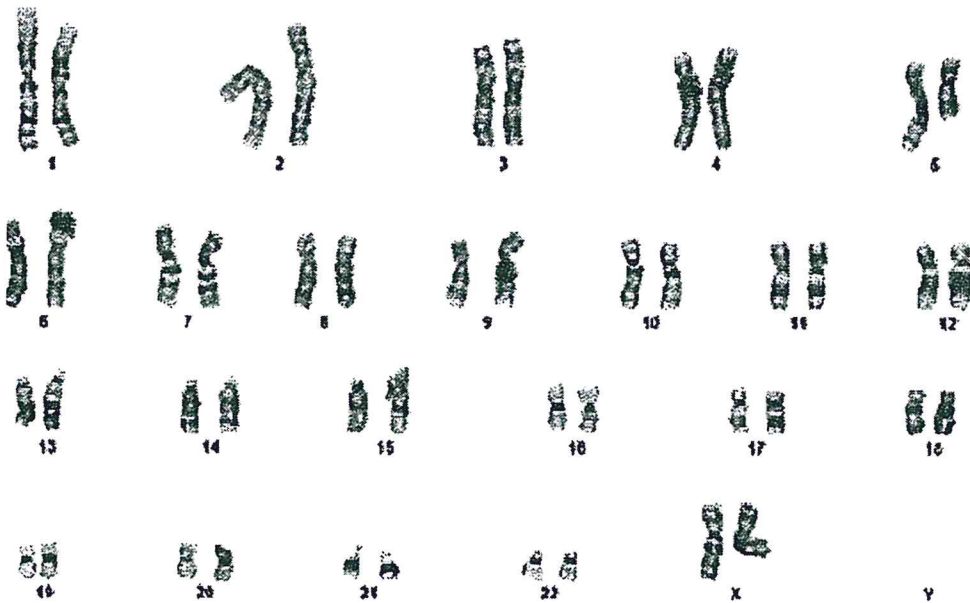
- 4.1 Correct the white cell count (show all calculations) (4)
- 4.2 Describe in detail the most important feature of the above peripheral smear. Include all cell lines in your answer. (5)
- 4.3 Use one word to describe the above blood picture. (1)
- 4.4 Does this patient has a myeloproliferative disorder or myelodysplasia? Briefly motivate your answer by highlighting the main differences between the two disorders. (6)

4.5 A bone marrow aspirate sample was sent to the molecular genetics laboratory to test for the BCR/ABL hybrid oncogene and the JAK2-V617 and MPL gene mutations. Explain why these tests are important in the laboratory investigation of these disorders. (6)

4.6 The BCR/ABL oncogene was not present but mutation of the MPL gene was detected and the reticulin stain on the bone marrow trephine was positive. Considering all the above information, including the clinical presentations, suggest a diagnosis. (3)

QUESTION 5 [10]

A 60-year-old female presented with anaemic symptoms and easy bruises. The following karyotypic results were obtained.



5.1 Mention the myelodysplastic disorder that the karyotype result is associated with. (2)

5.2 Describe the laboratory features of this disease. (8)

QUESTION 6**[10]**

- 6.1 List 7 investigation methods used in the diagnosis of leukaemia in haematology. (7)
- 6.2 Microscopic evaluation of the smears by an expert is still considered the gold standard in the diagnosis of haematological disorders. Explain why? (3)

QUESTION 7**[15]**

A 70-year-old old man was seen in the clinic for dizziness, lethargy and weakness and on examination he was found to have a large spleen. A bone marrow biopsy showed megakaryocytes that cluster around the marrow sinusoids. The results of his blood count was as follows:

WBC:	15.1x 10 ⁹ /l
RBC:	5.6 X 10 ¹² /l
Hb:	21.2g/dl
Plts:	462x 10 ⁹ /l

- 7.1 Which of the myeloproliferative disorders are these results compatible with? Give reasons for your answer and state the gene mutation present. (7)
- 7.2 Predict if the serum B12 and erythropoietin levels will be decreased, normal or increased in this condition (2)
- 7.3 In which of the four myeloproliferative disorders is the gene found in the above disorder not present? (2)
- 7.4 Referring to your answer in 7.3, which cytogenetic abnormality does it have, and which genes are involved? (4)

End of Examination

Total Marks: [100]

Good Luck!