



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH AND APPLIED SCIENCES**

**DEPARTMENT OF HEALTH SCIENCES**

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| <b>QUALIFICATION : BACHELOR OF MEDICAL LABORATORY SCIENCES</b> |                                    |
| <b>QUALIFICATION CODE:</b> 08BMLS                              | <b>LEVEL:</b> 6                    |
| <b>COURSE CODE:</b> HAM612S                                    | <b>COURSE NAME:</b> HAEMATOLOGY 2B |
| <b>SESSION:</b> JANUARY 2019                                   | <b>PAPER:</b> THEORY               |
| <b>DURATION:</b> 3 HOURS                                       | <b>MARKS:</b> 100                  |

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| <b>SUPPLEMENTARY/ SECOND OPPORTUNITY EXAMINATION PAPER</b> |                        |
| <b>EXAMINER(S)</b>   | <b>EDWIG HAUWANGA</b>  |
| <b>MODERATOR:</b>  | <b>DR MARTIN GONZO</b> |

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| <b>INSTRUCTIONS</b>  |  |
| <ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li></ol> |  |

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

**SECTION A (30 MARKS)****QUESTION 1****[15]**

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 Which of the following cells have non-phagocytic functions? (1)
- (A) Neutrophils
  - (B) Eosinophils
  - (C) Lymphocytes
  - (D) Monocytes
- 1.2 The process by which white blood cells move into the surrounding tissues through capillaries is known as? (1)
- (A) Margination
  - (B) Diapedesis
  - (C) Endocytosis
  - (D) Storage
- 1.3 Identify the morphological characteristics associated with the Chediak-Higashi syndrome? (1)
- (A) Giant lysosomal granules
  - (B) Hypersegmented neutrophils
  - (C) Pale blue inclusions in cytoplasm of neutrophils
  - (D) Pyknotic nuclei
- 1.4 When observing a peripheral blood smear, at times it can be hard to distinguish a blast from a lymphocyte. What is the best way to distinguish a blast from a lymphocyte? (1)
- (A) A blast has granules and lymphocyte not
  - (B) A lymphocyte has a lower N:C ratio
  - (C) A lymphocyte has more condensed chromatin
  - (D) Lymphocyte has a folded nucleus
- 1.5 A 19-year-old presented with fever, sore throat, ear aches and headache. The FBC had elevated lymphocytes and peripheral blood showed reactive lymphocytes. What is the most likely diagnosis? (1)
- (A) Infectious Mononucleosis
  - (B) Burkitt's Lymphoma
  - (C) Acute promyelocytic leukaemia
  - (D) B-cell acute leukaemia
- 1.6 Which of the following features are confirmatory of the diagnosis in question 1.5? (1)

- (A) High EBV titre, leukopenia and thrombocytosis, positive M
- (B) High EBV titre, slight leucocytosis, slight thrombocytopaenia and Positive Monospot tests
- (C) Low EBV titre, leukopenia, thrombocytosis and Positive Monospot test
- (D) Low EBV titre, leucocytosis, thrombocytopenia and Positive Monospot tests

1.7 A 26-year-old healthy male suffers from trauma to the abdomen in a motor vehicle accident and a splenectomy was performed. Identify the most likely peripheral blood findings to be present after the splenectomy? (1)

- (A) Thrombocytosis with levels upto  $1000 \times 10^9/L$
- (B) Basophilia
- (C) Dohle bodies
- (D) Lymphopenia

1.8 Fill in the missing word: The aetiology of haematological malignancies is widely unknown, however, viruses such as..... has been implicated in Adult-T cell leukaemia. (1)

- (A) Human immunodeficiency Virus
- (B) Epstein Bar Virus
- (C) Hepatitis B virus
- (D) Human T cell virus

1.9 A 16-year-old boy, presented with swelling of the lower jaw, lymphadenopathy and fever. FBC marked elevated WBC and thrombocytopaenia. The peripheral blood smear showed medium sized to large blasts, with round nucleus, prominent nucleoli and abundant cytoplasmic vacuoles. What is the most likely diagnosis? (1)

- (A) T-cell large granular lymphocytic leukaemia
- (B) Adult- T cell leukaemia
- (C) Sezary Syndrome
- (D) Burkitt's Lymphoma

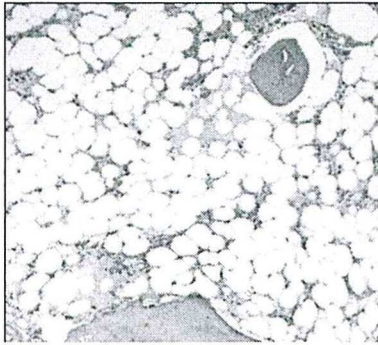
1.10 Identify the area in which the disorder diagnosed in question 1.9 is endemic in? (1)

- (A) African
- (B) Caribbean
- (C) Latin America
- (D) European

1.11 Blood donors are normally bled to save lives of patients. However, there are some conditions that require one to donate blood as part of their treatment to save their own lives. Which of the following condition will this form of treatment apply to? (1)

- (A) Polycythaemia Vera
- (B) Pancytopenia
- (C) Leukaemia
- (D) Iron Deficiency Anaemia

1.12 Which of the following terms best describes the bone marrow morphology below? (1)



- (A) Normal
- (B) Aplastic
- (C) Hypercellular
- (D) Hyperproliferative

1.13 Choose the genetic abnormality associated with Acute myelo-monocytic leukaemia (AML M3). (1)

- (A) Trisomy 21
- (B) t(8:21)
- (C) JAK2
- (D) Inv (16)

1.14 Which of the following factors will fall considerably within hours of warfarin administration? (1)

- (A) II
- (B) IIV
- (C) VII
- (D) X

1.15 Fill in the missing word: In immune thrombocytopenia, platelets are coated with..... which causes them to be destroyed by the RE system, causing thrombocytopenia (1)

- (A) IgM autoantibody
- (B) IgG alloantibody
- (C) IgG Autoantibody
- (D) IgM alloantibody

**QUESTION 2****[10]**

For each of the following definitions, give the appropriate technical term:

- 2.1 White blood cell with a degenerated nucleus and a loss of chromatin. This structure represents death of the cell (1)
- 2.2 A white cell anomaly characterized by the presence of dark staining coarse granules resembling toxic granulation. It is associated with mucopolysaccharides (1)
- 2.3 The cell representing the end stage of B lymphocyte lineage (1)
- 2.4 A molecular diagnostics technique involving visualization of chromosome under the microscope. can detect large chromosomal abnormalities such as loss or gain of an entire chromosome or portions of a chromosome and translocations. (1)
- 2.5 The acid used in treating patients with acute promyelocytic leukaemia (AML M3) (1)
- 2.6 A group of haematological disorders characterized by ineffective haemopoiesis of one or more myeloid cell lines. (1)
- 2.7 A 60-year-old female who noticed the sudden appearance of multiple petechiae on her extremities and mild epistaxis. The FBC revealed severe thrombocytopaenia with a platelet count of  $26 \times 10^9/L$  and bone marrow showed increased megakaryocytes. The most likely diagnosis would be: (1)
- 2.8 A genetic abnormality implicated in most of the Myeloproliferative disorders. (1)
- 2.9 Ineffective forms of plasmodium released into blood stream through an anopheles mosquito bite. They travel to the liver where they develop (1)
- 2.10 Intravenous anticoagulant used in thrombosis therapy, works by potentiating antithrombin (1)

**QUESTION 3****[5]**

Complete the following table by indicating whether Prothrombin time and Thrombin Thromboplastin time would be, prolonged or normal in the following conditions:

|           | Warfarin | Heparin | Severe DIC | Idiopathic Thrombocytopenic Purpura | VitK deficiency |
|-----------|----------|---------|------------|-------------------------------------|-----------------|
| (4.1) PI  |          |         |            |                                     |                 |
| (4.2) PTT |          |         |            |                                     |                 |

(2.5)

(2.5)

**SECTION B (38 MARKS)****QUESTION 4****[12]**

4.0 Neutrophils are primary white blood cells involved in the body's function of fighting pathogens. Answer the following questions concerning these cells

4.1 Demonstrate the maturation series of the neutrophil in the correct order (6)

4.2 Which stages do the specific and non-specific granules start appearing? (2)

4.3 What is the normal range of neutrophil percentage in a differential count? (2)

4.4 State the correct terms used to describe decreased percentages and elevated percentages of neutrophils above the normal range? (2)

**QUESTION 5****[12]**

5.0 Briefly describe the spleen under the following headings:

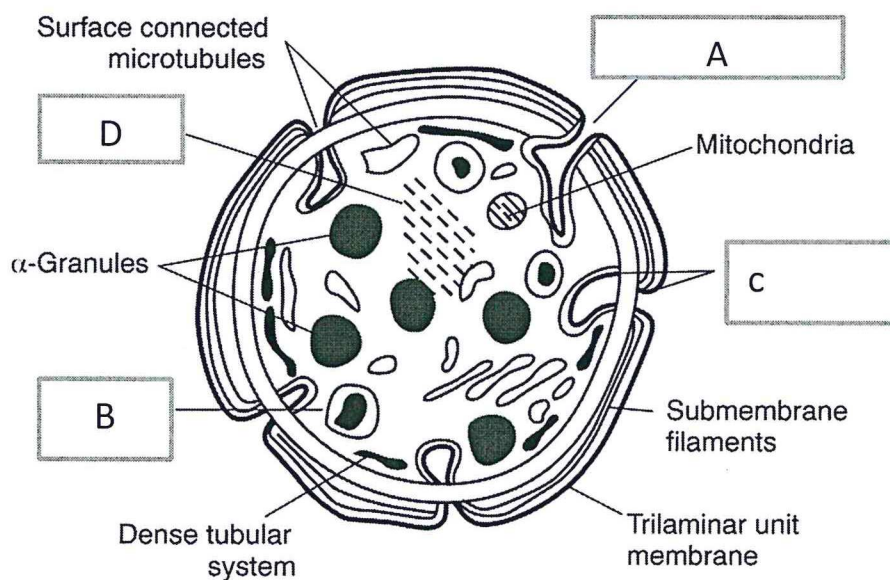
5.1 Its circulation (4)

5.2 Its functions (4)

5.3 What is the major consequence of having a splenectomy and how can some of its side effects be mitigated? (4)

**QUESTION 6****[14]**

Study the diagram below outlining the structure of platelets and answer the following questions



- 6.1 Label different parts of the platelet as indicated by the Alphabetic letters (4)
- 6.2 Outline the function of part A (2)
- 6.3 List at least three substances released from part B (3)
- 6.4 Briefly describe how platelets are produced (4)
- 6.5 Platelets have..... on the surface coat which are important in platelet reactions of adhesion and aggregation in haemostasis. (fill in the missing word) (1)

### SECTION C (32 Marks)

#### QUESTION 7

[14]

7.0 A 58 year old lady came in complaining about weakness, pallor, abdominal pain and sudden weight loss. Her spleen was also enlarged and had bruises from randomly bumping herself around the house. Samples were sent into the laboratory and the FBC and differential count results are as follows:

| Patient Results           | Units                  |
|---------------------------|------------------------|
| White cell count          | 162x10 <sup>9</sup> /L |
| HB                        | 8.9g/dL                |
| Platelets                 | 420x10 <sup>9</sup> /L |
| Neutrophils               | 68 %                   |
| Lymphocytes               | 5%                     |
| Monocytes                 | 2%                     |
| Eosinophils               | 2%                     |
| Basophils                 | 3%                     |
| Promyelocytes             | 2%                     |
| Metamyelocytes            | 8%                     |
| Myelocytes                | 10%                    |
| Nucleated red blood cells | 9/100                  |

Analyse the case and the full blood count results and answer the following questions:

- 7.1 What is the most likely diagnosis? (2)
- 7.2 Describe the pathogenesis of this disorder? (8)
- 7.3 Suggest further laboratory investigations and their expected results. (4)

**QUESTION 8**

**[18]**

8.1 Classify myelodysplastic syndromes and for each suggest at least two expected bone marrow findings:

**End of Exam!**