



UNIVERSITI KUALA LUMPUR
INSTITUTE OF MEDICAL SCIENCE TECHNOLOGY

FINAL EXAMINATION
MARCH 2025 SEMESTER

COURSE CODE : HDB30803
COURSE TITLE : ADVANCED HEMATOLOGY
PROGRAMME NAME : BACHELOR OF BIOMEDICAL SCIENCE (HONOURS)
DATE : 24 JUNE 2025
TIME : 9:00AM - 12:00PM
DURATION : 3 HOURS



INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of ONE sections.
4. Section A consist of five questions. Answer FOUR (4) questions only.
5. Please write your answer on the answer booklet provided.
6. Please answer all questions in English only.
7. Refer to the attached Formula/ Appendies. *Tick if applicable*

THERE ARE 5 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 100 marks)

Answer FOUR (4) questions.

Please use the answer booklet provided.

Question 1

Explain the key differences between Hemophilia A, Hemophilia B, and von Willebrand disease, focusing on their etiology, inheritance, clinical presentations, diagnostic approaches, and treatment options.

(25 marks)

Question 2

Ahmad, a 4-year-old boy presenting to the clinic with dark-coloured urine and fatigue after eating fava beans two days ago. On examination, there is no abnormal findings. The physical examination shows icteric sclera with no fever, vomiting, or diarrhoea. Lab diagnosis demonstrates that hematocrit level is 30%. Peripheral blood smear shows RBCs with numerous Heinz bodies and bite cells. The fluorescent spot test demonstrates decrease activity of G6PD enzyme assay. There is a family history of this disorder, whereas the father has experienced of similar symptoms during childhood.

- (a) Describe how a deficiency in the G6PD enzyme leads to the development of Heinz bodies in the case discussed.

(8 marks)

- (b) Explain the procedure and result interpretation of the G6PD fluorescent spot test performed in hematology laboratory.

(14 marks)

- (c) Suggest three therapeutic approaches that could improve Ahmad's condition.

(3 marks)

Question 3

Mrs. Nadia, is a 68-year-old Malay woman who has retired for the past 10 years. She was encouraged to go to her family doctor by her husband. On physical examination, the doctor observed a plethoric appearance on her face. She also suffers of headache and discomfort in her chest and stomach areas. In addition, she also experiences of body itches after a hot shower but there was no sign of skin rash. The doctor carried out several blood and other necessary tests. The laboratory results were shown in the following table:

Refer Below - Table1 : Mrs.Nadia laboratory test .

Table 1: Mrs.Nadia laboratory test

Test	Result
Hemoglobin concentration	17.5 g/dL
Hematocrit	60%
RBC count	$6.8 \times 10^{12}/L$
WBC count	$13.2 \times 10^9/L$
Platelets count	$535 \times 10^9/L$
Serum erythropoietin	Normal
Serum uric acid	> 7 mg/dL
Chest X-ray	Enlarged spleen
Genetic test	Expression of JAK2 V617F mutation

- (a) Based on the above result, identify her possible disease. (2 marks)
- (b) Explain the possible pathogenesis of the identified disease in (a). (15 marks)
- (c) Explain why she experiences itchiness after taking a hot shower. (4 marks)
- (d) Suggest what might be observed if doctor proceed with the bone marrow examination. (4 marks)

Question 4

Chromosomal translocations are often associated with hematological malignancy. Chronic myeloid leukemia (CML) accounts for 15%–20% of all adult leukemias. The Philadelphia chromosome (Ph) is a hallmark of CML. This Ph chromosome not only impairs the physiological signaling pathways but also persistently enhanced tyrosine kinase activity. This tyrosine kinase activity is responsible for maintaining proliferation, inhibiting differentiation, and conferring resistance to cell death. Tyrosine kinase inhibitors (TKIs) such as imatinib are the most successful targeted therapy in patients with CML.

- (a) Aided with diagram of chromosomal translocation, explain the Philadelphia chromosome in CML.

(10 marks)

- (b) Discuss the three stages of clinical phase commonly observed in patients with CML.

(15 marks)

Question 5

Stem cell transplantation (SCT) is a medical procedure used to replace damaged or destroyed bone marrow with healthy stem cells. The first allogeneic bone marrow transplant (BMT) in Malaysia was successfully carried out at the Universiti Malaya Medical Centre (UMMC) in 1987, marking a major milestone of the transplant medicine in the country. This early transplant was performed on a leukemia patient where stem cells were taken from a compatible donor. This pioneering effort opened doors for advanced treatment approaches of blood cancers and genetic blood disorders in the country.

- (a) Discuss the procedure of allogeneic stem cell transplant. (15 marks)
- (b) Explain the reason for doing SCT in clinical practice. (6 marks)
- (c) State two complications associated with allogeneic SCT. (4 marks)

END OF EXAMINATION PAPER

