



Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 4233 Applied Biochemistry
Batch – 05
4th Year 2nd Semester
End semester Special Repeat SEQ Examination

Date : 27th of April 2026
Time : 9.00 am. – 12.00 noon (Three Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are allowed to use a scientific calculator for the examination.

QUESTION 01

(100 marks)

- 1.1. Elaborate the physiological basis of the oral glucose tolerance test (OGTT). (25 marks)
- 1.2. State the standard procedure for conducting an OGTT. (25 marks)
- 1.3. List three (03) significance of OGTT. (15 marks)
- 1.4. Review four (04) factors affecting OGTT results. (20 marks)
- 1.5. List three (03) limitations of OGTT results. (15 marks)

QUESTION 02

(100 marks)

- 2.1. List four (04) components in clinical examination of a stool sample. (20 marks)
- 2.2. "A patient presents with normal gamma-glutamyl transferase (GGT) levels but shows an elevated alkaline phosphatase (ALP) level in plasma." Interpret this statement. (20 marks)
- 2.3. List parameters test in renal function test. (20 marks)
- 2.4. What are the diagnostic importance of following markers?
 - 2.4.1 Serum albumin (20 marks)
 - 2.4.2 Serum alanine aminotransferase (ALT) (20 marks)

QUESTION 03

(100 marks)

A 30-year-old woman and her 35-year-old partner present to a fertility clinic with a history of inability to conceive. The woman reports irregular menstrual cycles, while the male partner complains of reduced libido and fatigue. Initial investigations suggest possible hormonal imbalance in both partners.

- 3.1. Distinguish between subfertility and infertility. (10 marks)
- 3.2. Identify possible hormonal causes of subfertility in both the male and female partner. (20 marks)
- 3.3. Explain the role of key reproductive hormones of Follicle-Stimulating Hormone (FSH), Luteinizing hormone (LH), estrogen, progesterone, and testosterone in fertility. (30 marks)
- 3.4. Interpret the laboratory investigations used to evaluate hormonal imbalances in this couple. (40 marks)

QUESTION 04**(100 marks)**

4.1. A 29-year-old pregnant woman in her first trimester presented with palpitations, anxiety, excessive sweating, and unintentional weight loss. Her thyroid profile report is given below:

Parameter	Result	Reference Range
TSH	0.02 mIU/L	0.4 – 4.0 mIU/L
Free T4	2.5 ng/dL	0.8 – 1.8 ng/dL
Free T3	5.8 pg/mL	2.3 – 4.2 pg/mL

- 4.1.1. Interpret the thyroid function test results and identify the most likely diagnosis. Support your answer with biochemical reasoning. (20 marks)
- 4.1.2. State two (02) possible causes for this thyroid abnormality in pregnancy. (10 marks)
- 4.1.3. Recommend two (02) additional laboratory investigations that would help determine the underlying cause. (10 marks)
- 4.2. Discuss five (05) maternal and fetal complications associated with untreated thyroid disorders during pregnancy. (30 marks)
- 4.3. Explain the role of the clinical laboratory in the diagnosis and monitoring of thyroid disorders. (30 marks)

QUESTION 05**(100 marks)**

- 5.1. List five (05) biochemical markers commonly used in the diagnosis of acute myocardial infarction. (15 marks)
- 5.2. Describe the release pattern of creatine kinase-MB (CK-MB) and troponin following myocardial injury. (25 marks)
- 5.3. Discuss the clinical advantages and limitations of using troponin as a cardiac biomarker in emergency laboratory diagnosis. (30 marks)
- 5.4. Explain the importance of age-adjusted laboratory interpretation when evaluating cardiovascular biomarkers in elderly patients. (30 marks)

QUESTION 06**(100 marks)**

- 6.1. State four (04) types of prostatitis of the prostate gland. (20 marks)
- 6.2. Differentiate the Prostate Specific-Antigen (PSA) screening values in benign prostatic hyperplasia (BPH) and prostate cancer. (25 marks)
- 6.3. Briefly describe the role of dihydrotestosterone (DHT) in benign prostatic hyperplasia (BPH). (25 marks)
- 6.4 Briefly describe the mechanism of benign prostatic hyperplasia (BPH). (30 marks)



Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 4213 Immunobiology
Batch – 05
4th Year 2nd Semester
Repeat End Semester SEQ Examination

Date : 23rd of April 2026
Time : 9.00 am. – 12.00 noon. (Three Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

(100 marks)

- 1.1 Define the antibody mediated and cell mediated immunity. (15 marks)
- 1.2 State the functions of the memory cells in immunity. (25 marks)
- 1.3 Differentiate the primary and secondary immune response. (25 marks)
- 1.4 Briefly describe the mechanism of inflammation. (35 marks)

Question 02

(100 marks)

- 2.1 Define the components of the second line defense mechanism of innate immunity. (20 marks)
- 2.2 Briefly describe the mechanism of phagocytosis. (20 marks)
- 2.3 Briefly describe the importance of opsonization. (25 marks)
- 2.4 Explain the mechanism of activation of humoral immunity with the presence of superantigen. (35 marks)

Question 03

(100 marks)

- 3.1 Identify active immunity and passive immunity. (20 marks)
- 3.2 Briefly explain the clonal selection theory. (30 marks)
- 3.3 Write short notes on following topics,
- 3.3.1 Classical pathway (25 marks)
- 3.3.2 Alternative pathway (25 marks)

Question 04**(100 marks)**

- 4.1 Define the term "hypersensitivity". (20 marks)
- 4.2 Briefly explain the mechanism of type I hypersensitivity. (25 marks)
- 4.3 Differentiate between the live attenuated vaccine and inactivated vaccines. (25 marks)
- 4.4 Mention the importance of the recombinant vaccine. (30 marks)

Question 05**(100 marks)**

- 5.1 Define the term "peripheral tolerance". (20 marks)
- 5.2 Briefly describe the immune mechanism of Graves' disease. (20 marks)
- 5.3 Write the short notes on the following.
- 5.3.1 Indirect presentation of autoimmunity (30 marks)
 - 5.3.2 Direct presentation of autoimmunity (30 marks)

Question 06**(100 marks)**

- 6.1 Define the terms "heptens". (20 marks)
- 6.2 Differentiate the linear epitope and conformational epitope. (20 marks)
- 6.3 Briefly describe cytosolic pathway for presenting endogenous antigens. (30 marks)
- 6.4 A patient is admitted to the hospital with fever and a low platelet count, and the doctor suspects a dengue infection. As a biomedical scientist, suggest a primary immunological test that could be performed for the patient, along with the steps of the test method. (30 marks)



Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 4233 Applied Biochemistry
Batch – 05
4th Year 2nd Semester
End semester SEQ Examination

Date : 18th of July 2025
Time : 9.00 am. – 12.00 pm (Three Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are allowed to use a scientific calculator for the examination.

QUESTION 01

(100 marks)

1.1 Illustrate normal pattern of serum protein electrophoresis.

(25 marks)

1.2 List the deviations of normal pattern of serum protein electrophoresis in following conditions.

1.2.1 Cirrhosis

(15 marks)

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1.2.2 Acute inflammation

(15 marks)

1.3 A 60-year-old male patient is brought to the emergency department with shortness of breath, confusion, and rapid breathing. He has a history of chronic obstructive pulmonary disease (COPD). Arterial blood gas (ABG) analysis is performed with the following results:

Reference Range

• pH: 7.25.	(7.35-7.45)
• PaCO ₂ : 60 mmHg	(35-45 mmHg)
• HCO ₃ ⁻ : 26 mEq/L	(22-26 mEq/L)
• PaO ₂ : 55 mmHg	(80-100 mmHg)

1.3.1 Name **four (04)** main types of acid-base disorders.

(20 marks)

1.3.2 Interpret the acid-base status of the patient.

(25 marks)

QUESTION 02**(100 marks)**

2.1 A 45-year-old woman attends a routine health screening. She has no significant medical history but mentions feeling more tired than usual and experiencing increased thirst over the past few months. Her fasting blood glucose level is reported as **132 mg/dL** (normal: 70–99 mg/dL).

2.1.1 Identify the patient condition.

(15 marks)

2.1.2 Name another **two (02)** tests which can be recommended to confirm the condition you mentioned in 2.1.1.

(15 marks)

2.2 A 52-year-old male with a history of chronic alcohol consumption presents with fatigue, yellowing of the eyes, and abdominal discomfort. A liver function test (LFT) is ordered, and the results are as follows:

Test	Result	Reference Range
Total Bilirubin	4.2 mg/dL	0.2 – 1.2 mg/dL
Direct Bilirubin	2.8 mg/dL	0.1 – 0.4 mg/dL
AST (SGOT)	185 U/L	10 – 40 U/L
ALT (SGPT)	92 U/L	7 – 56 U/L
ALP	180 U/L	44 – 147 U/L
Albumin	2.6 g/dL	3.4 – 5.4 g/dL

2.2.1 Identify patient condition interpreting a report.

(25 marks)

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2.3 A 65-year-old male with a history of hypertension and type 2 diabetes presents with swelling in his ankles, fatigue, and decreased urine output. A kidney function test is performed, and the results are as follows:

Test	Result	Reference Range
Blood Urea Nitrogen (BUN)	48 mg/dL	7 – 20 mg/dL
Serum Creatinine	2.3 mg/dL	0.6 – 1.2 mg/dL
Estimated GFR (eGFR)	38 mL/min/1.73 m ²	> 60 mL/min/1.73 m ²
Serum Potassium	5.6 mEq/L	3.5 – 5.1 mEq/L
Serum Sodium	134 mEq/L	135 – 145 mEq/L
Urinalysis	Proteinuria, no hematuria	

2.3.1 Interpret above report.

(25 marks)

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2.3.2 Briefly explain the reason for odema formation in this patient.

(20 marks)

QUESTION 03

(100 marks)

3.1. You have been provided with the following thyroid profile report of a 35-year-old female patient presenting with fatigue, weight gain, and cold intolerance:

Parameter	Result	Reference Range
TSH	8.5 mIU/L	0.4 – 4.0 mIU/L
Free T4	0.7 ng/dL	0.8 – 1.8 ng/dL
Free T3	2.1 pg/mL	2.3 – 4.2 pg/mL

3.1.1. Interpret the thyroid function test results and suggest the most likely diagnosis. Justify your answer.

(20 marks)

3.1.2. List two (02) possible causes for the thyroid dysfunction identified in this patient.

(10 marks)

3.1.3. Suggest two (02) additional investigations that may help in confirming the underlying cause.

(10 marks)

3.2. Mention five (05) factors for the occurrence of thyroid disease during pregnancy. (30 marks)

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3.3. Write a short note on the importance of thyroid function tests in the laboratory. (30 marks)

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QUESTION 04

(100 marks)

4.1. List five common types of cardiac enzymes measured in clinical laboratories. (15 marks)

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4.2. Explain the clinical significance of troponin as a cardiac biomarker. (30 marks)

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4.3. Compare and contrast the biochemical changes observed in normal aging versus those seen in cardiovascular diseases. (25 marks)

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4.4. Discuss the challenges and implications of using standard laboratory reference ranges for diagnosing cardiac conditions in elderly patients. (30 marks)

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QUESTION 05

(100 marks)

5.1. Differentiate between infertility and subfertility.

(10 marks)

[illegible]

5.2. List the most common causes of subfertility in both males and females.

(20 marks)

[illegible]

5.3. Mention the hormonal regulation of the male reproductive system, including the roles of GnRH, FSH, LH, testosterone, and inhibin. (30 marks)

[illegible]

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(100 marks)

[illegible]

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63. Briefly state the role of dihydrotestosterone (DHT) in benign prostatic hyperplasia (BPH).

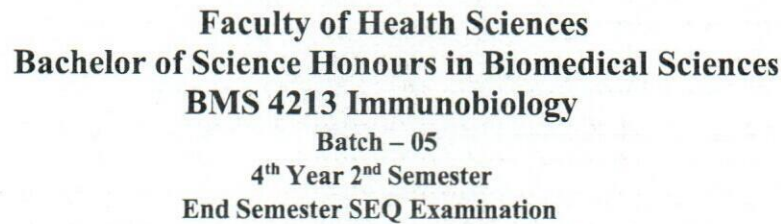
(25 marks)

[illegible]

6.4. State the five (05) causes of prostatitis disorder.

(25 marks)

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State your opinion on the statement given. (25 marks)

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(100 marks)

(25 marks)

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Question 04**(100 marks)**

4.1 Illustrate and label the Major Histocompatibility Complex Class II (MHC II). (25 marks)

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4.2 State five (05) structural differences between MHC Class I and MHC Class II. (25 marks)

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4.3 Outline the steps of the cytosolic pathway for endogenous antigens. (25 marks)

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[illegible]

4.4 State the functions of MHC Class I and MHC Class II.

(25 marks)

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Question 05

(100 marks)

5.1 Define three (03) peripheral tolerance mechanisms of T cells.

(25 marks)

[illegible]

5.2 Outline the autoimmune mechanism involved in Graves' disease.

(25 marks)

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5.3 Define the different types of grafts used in transplantation.

(25 marks)

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5.4 Outline the recognition pathway of an alloantigen by T cells through direct presentation.

(25 marks)

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(100 marks)

(25 marks)

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(25 marks)

[illegible]

(25 marks)

[illegible]

6.4. State the steps of a rapid laboratory technique that qualitatively measures the presence of antigen or antibody. (25 marks)

[illegible]



Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 4213 Immunobiology
Batch – 04
4th Year 2nd Semester
Special Repeat End Semester SEQ Examination

Date : 04.06.2025
Time : 9.00 am. – 12.00 pm. (Three Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

(100 marks)
(25 marks)

1.1 Define the adaptive immunity of the immune system.

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1.2 Outline the role of antigen-presenting cells in initiating adaptive immune responses.

(25 marks)

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1.3 Compare and contrast the humoral and cell-mediated arms of adaptive immunity (25 marks)

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1.4 Outline the contribution of adaptive immune products to innate host defense. (25 marks)

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Question 02

(100 marks)

2.1 Define the molecule "opsonin".

(25 marks)

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2.2 Outline the activation of T and B lymphocytes via an antigen.

(25 marks)

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3.2 Briefly explain the forms of immunoglobulins.

(25 marks)

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3.3 Illustrate and label the typical antibody structure.

(25 marks)

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3.4 Briefly state five types of antibodies and their specific functions.

(25 marks)

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Question 05**(100 marks)**

5.1 State the types of major histocompatibility complexes along with their function. (25 marks)

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5.2 Outline the mechanism of one of the MHC molecules mentioned (5.1). (25 marks)

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5.3 State the steps of activation of classical complement pathway. (25 marks)

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5.4 State the importance of antibody dependent cellular cytotoxic (ADCC) pathway to eliminate hook worm infection.

(25 marks)

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Question 06

(100 marks)

6.1 Define the term transplantation rejection.

(25 marks)

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6.2 State the main reason for the graft rejection during transplantation.

(25 marks)

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6.3 Briefly outline the transplantation rejection take place via direct presentation by T cells.

(50 marks)

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Faculty of Health Sciences
Bachelor of Science Honors in Biomedical Science
BMS 4223 - Laboratory Management
Batch – 05
End Semester SEQ

Date : 16.07.2025
Time : 9.00 am- 12.00 noon (Three Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

QUESTION 01

(100 marks)
(15 marks)

1.1 Write three types of laboratories.

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1.2 Write three external factors that can affect the operation and performance of a laboratory. (15 marks)

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1.3 Explain the roles and responsibilities of laboratory director based on “Quality Control and Assurance”.

(30 marks)

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1.4 Explain the importance of laboratory policies.

(25 marks)

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1.5 Write three factors when designing a laboratory.

(15 marks)

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QUESTION 02

(100 marks)

2.1. State three types of physical resources in a laboratory.

(15 marks)

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2.2 Explain the role of quality control in equipment management.

(30 marks)

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2.3 Explain the importance of the calibration of laboratory equipment.

(25 marks)

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2.4 Explain how laboratory layout and design affect the efficiency and safety of laboratory operations.

(30 marks)

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QUESTION 03**(100 marks)**

3.1 A laboratory needs to prepare a 2 L solution of 0.5 M hydrochloric acid (HCl) from a concentrated stock solution of 12 M HCl. The lab also wants to calculate reagent usage and cost for monthly consumption based on weekly preparations. The lab prepares this solution twice a week.

- Molarity of stock HCl = 12 M
- Desired solution volume = 2 L
- Desired molarity = 0.5 M
- Cost of concentrated HCl = 100 LKR per Liter

3.1.1 Calculate the volume of the 12 M stock solution required to prepare 2 L of 0.5 M HCl solution.

(20 marks)

3.1.2 Calculate how much water (in liters) must be added to the stock solution to prepare the 2 L solution.

(20 marks)

3.1.3 Determine the total volume of 12 M HCl stock solution used per month, assuming two preparations per week and four weeks in a month.

(30 marks)

3.1.4 Calculate the monthly cost of the concentrated HCl used for these preparations. (30 marks)

QUESTION 04

(100 marks)

4.1 Briefly outline the measures of preventing the effect of pre-analytical errors in the total testing process.

(20 marks)

4.2 Differentiate between analytical precision and accuracy in the quality control of analytical phase.

(20 marks)

4.3 Briefly describe the method of assuring analytical precision in serum cholesterol estimation test.

(30 marks)

4.4 Outline the process of result validation in the post analytical phase with examples. (30 marks)

QUESTION 05 (100 marks)

5.1 State the basic management functions. (5 marks)

5.2 Briefly explain how the above management functions are effectively used in establishing a chemical pathology laboratory. (30 marks)

5.3 Outline the responsibilities of human resource management in an organization. (25 marks)

5.4 As a laboratory manager you are assigned to establish a performance appraisal for your laboratory. Write a brief report on different performance appraisal methods applicable for a laboratory. (40 marks)

QUESTION 06**(100 marks)**

6.1 Outline how different channels of communications are effectively used for the flow of information in a laboratory. (30 marks)

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6.2 State the steps in effective decision-making process. (20 marks)

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6.3 Assume you are a manager of ABC laboratory service. The organization has planned to establish a new sample collection center. Briefly describe how you would implement the above decision-making process when establishing the sample collecting center. (50 marks)

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