



UNIVERSITI KUALA LUMPUR
INSTITUTE OF MEDICAL SCIENCE TECHNOLOGY

FINAL EXAMINATION
OCTOBER 2025 SEMESTER

COURSE CODE : HDB21004
COURSE TITLE : BASIC AND SYSTEMIC PATHOLOGY
PROGRAMME NAME : BACHELOR OF BIOMEDICAL SCIENCE (HONOURS)
DATE : 28 JANUARY 2026
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 10 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 100 marks)

Answer FOUR (4) questions.

Please use the answer booklet provided.

Question 1

A 34-year-old female presents to her primary care physician complaining of persistent fatigue, unexplained weight gain, and "puffiness" in her face over the last 6 months. She reports feeling excessively cold even in warm weather and has experienced frequent constipation and memory lapses. Her medical history includes a long-standing struggle with dysmenorrhea and difficulty conceiving despite trying for 2 years. Recently, she noticed sudden swelling in her legs and foamy urine. A urinalysis performed at a local clinic revealed heavy proteinuria. Her current medications include NSAIDs for menstrual pain.

Diagnostic Investigation findings:

1. Thyroid Ultrasound: Diffuse enlargement of the thyroid gland with hypoechoic areas.
2. Thyroid Blood Tests: Elevated TSH (>10 mIU/mL), Low Free thyroxine (T4), & elevated anti-TPO antibodies
3. Pelvic Laparoscopy: Reveals multiple "powder-burn" lesions on the pelvic peritoneum and a large "chocolate cyst" on the left ovary.
4. Renal Biopsy Assessments: Glomeruli appear normal (light microscopy), negative immune complexes (immunofluorescence), diffuse effacement of podocyte foot processes (electron microscopy).

- (a) Based on the thyroid ultrasound, blood tests, and clinical symptoms, identify her endocrine disorder.

(2 marks)

- (b) Explain the specific pathogenesis involving immunologic mechanisms that leads to the destruction of thyroid epithelial cells in this condition.

(4 marks)

- (c) Describe the specific histopathological feature that would be seen if her thyroidectomy sample were observed under a light microscope.
(3 marks)
- (d) Based on the laparoscopic appearance, suggest the most probable condition.
(2 marks)
- (e) Discuss the most plausible pathogenesis theory responsible for producing the laparoscopic findings in this case.
(10 marks)
- (f) Based on the renal biopsy findings, identify the specific glomerular disease causing her sudden renal condition.
(2 marks)
- (g) Explain the etiology of her renal condition.
(2 marks)

Question 2

A 48-year-old male presents to the emergency department with excruciating stomach pain in his left flank radiating to the groin. He reports a history of chronic indigestion and diarrhea, particularly noticeable after his daily breakfast of toast and cereal. Social history reveals a 20-year history of heavy alcohol consumption and a diet rich in red meat. Physical examination shows a distended abdomen with mild jaundice.

Preliminary lab results:

Urinalysis: pH 5.0 (Acidic), Microscopic examination reveals diamond/rhomboid-shaped crystals.

Liver Function Tests: Elevated AST and ALT (AST:ALT ratio > 2:1), elevated GGT.

Serology: Positive for anti-tissue transglutaminase (tTG-IgA) antibodies.

- (a) Based on the dietary report and serology, identify the gastrointestinal disorder affecting this patient. (2 marks)
- (b) Discuss the pathogenesis of this gastrointestinal disorder. (6 marks)
- (c) If a small intestinal biopsy were performed, describe two (2) specific histopathological changes you would expect to observe in the mucosa. (2 marks)
- (d) The patient's jaundice and enzyme profile suggest alcoholic liver disease (ALD). If a liver biopsy were performed at the alcoholic hepatitis stage, describe three (3) specific histological features you would expect to see. (3 marks)
- (e) Explain the pathogenesis of liver damage in ALD. (5 marks)

- (f) Apart from alcohol cessation, name two (2) pharmacological treatments used for severe cases of this liver condition to reduce oxidative stress or suppress cytokines.

(2 marks)

- (g) Identify the specific type of renal stone causing the patient's flank pain, based on the urinalysis findings and his diet. Describe the characteristic appearance of the crystals found in his urine.

(2 marks)

- (h) Explain the pathogenesis of this specific stone formation, linking it to the patient's urine pH and dietary intake.

(3 marks)

Question 3

A 68-year-old male presents to the emergency department with high fever, shaking chills, and severe shortness of breath. He has a history of chronic wheezing, which worsens at night. His wife mentions that he has recently appeared "darker" in complexion, despite staying indoors, and has been complaining of joint stiffness in his hands that lasts for more than an hour every morning. Three weeks ago, he suffered a low-trauma fracture of his wrist after a minor fall.

Physical Examination:

Respiratory: Audible wheezing and crackles (rales) are heard in the lower right lung field.

Musculoskeletal: Symmetrical swelling and tenderness of the metacarpophalangeal (MCP) joints.

Skin: Generalized hyperpigmentation ("bronze" appearance).

Diagnostic Findings:

Chest X-ray: Right lobar consolidation and hyperinflated lung fields.

Blood Tests: Positive for Rheumatoid Factor (RF) and Anti-citrullinated Protein Antibodies (ACPAs), elevated Serum Ferritin and Transferrin Saturation (>50%), elevated C-Reactive Protein (CRP) and ESR.

Bone Density Scan (DEXA): T-score of -2.8 at the lumbar spine.

Sputum Culture: Positive for *Streptococcus pneumoniae*.

- (a) Based on the morning stiffness, symmetrical joint involvement, and positive serology (RF/ACPA), identify the specific joint disease. Describe the pathological structure known as "pannus" that forms in the joints of this patient. (3 marks)
- (b) Suggest one (1) pharmacological treatment for his joint disease. (1 marks)
- (c) The patient has a T-score of -2.8, indicating osteoporosis. Explain the pathogenesis of osteoporosis due to aging. (5 marks)

- (d) The patient's "bronze" skin pigmentation and elevated serum ferritin levels suggest a specific metabolic liver disease.

Suggest the most likely diagnosis and state the gene mutation responsible for this condition.

(2 marks)

- (e) Summarize the pathogenesis of his metabolic liver disease.

(4 marks)

- (f) The patient has a history of chronic wheezing and hyperinflated lungs, which are indicative of asthma. However, the current presentation of fever and lung consolidation suggests pneumonia. Compare the pathogenesis of these two diseases.

(10 marks)

Question 4

A 72-year-old male is brought to the clinic by his daughter, who reports that her father has become increasingly forgetful over the past two years, struggling with language and decision-making. He has also become withdrawn and moody. His medical history includes a 50-pack-year smoking history, though he quit 5 years ago. He complains of chronic shortness of breath and fatigue, which has worsened recently to the point where he cannot lie flat in bed without feeling suffocated.

Physical Examination:

Respiratory: Chest computed tomography (CT) scan shows bullae

Cardiovascular: Bilateral lower limb edema and jugular venous distention (JVD) are noted.

An echocardiogram reveals dilated ventricles with reduced ejection fraction.

- (a) Based on the cognitive decline and behavioral changes, suggest the specific neurodegenerative disease affecting this patient. (2 marks)
- (b) Discuss the pathogenesis of the specific neurodegenerative disease affecting this patient. (8 marks)
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- (c) The chest computed tomography (CT) scan finding points to a specific condition of chronic obstructive pulmonary disease (COPD). Identify this condition. (2 marks)
- (d) Discuss in detail the pathogenesis of the COPD. (9 marks)
- (e) The echocardiogram finding points to cardiomyopathy. Compare the dilated cardiomyopathy (DCM) with the hypertrophic cardiomyopathy (HCM). (4 marks)

Question 5

A 58-year-old male with a history of chronic heartburn and depression presents to the emergency department with the sudden onset of chest pain radiating to his left jaw, accompanied by profuse diaphoresis. He has managed his heartburn with over-the-counter antacids for over a decade but admits to persistent acid regurgitation. During the workup, he complains of chronic bone pain and muscle weakness. His wife notes that he has been drinking excessive amounts of water and urinating frequently.

Diagnostic Investigation findings:

Cardiac Biomarkers & ECG:

- Elevated Troponin I.
- ECG shows ST-segment depression and T-wave inversion.

Upper Endoscopy (UE):

- Reveals a "salmon-colored" columnar epithelium extending above the gastro-esophageal junction.
- Biopsy confirms the presence of goblet cells.

Blood Biochemistry:

- Serum Calcium: Highly Elevated (Hypercalcemia)
- Serum Parathyroid Hormone (PTH): Elevated
- Serum Phosphorus: Low (Hypophosphatemia)

Neck Imaging:

- Sestamibi scan shows focal uptake in the inferior right neck region.

- (a) Based on the ECG and cardiac biomarker findings, suggest his most probable cardiac condition or disease.

(2 marks)

- (b) Explain the characteristics of this cardiac condition regarding the extent of the vessel occlusion and the depth of the myocardial injury.

(3 marks)

- (c) If the ECG findings had instead shown abnormal ST-segment elevation, what would be the specific diagnosis? Describe the characteristics of this alternative condition regarding the extent of vessel occlusion and myocardial injury.

(3 marks)

- (d) The endoscopic finding of "salmon-colored" epithelium is pathognomonic for a specific condition arising from his chronic heartburn. Identify this condition.
(2 marks)
- (e) Explain the cellular adaptation mechanism that has occurred in his esophagus. Specifically, describe the change in epithelial type and the hallmark cell present in the biopsy.
(3 marks)
- (f) Why is this esophageal condition clinically significant in terms of cancer risk?
(2 marks)
- (g) Based on the blood biochemical findings and the Sestamibi scan result, identify the primary endocrine disorder.
(2 marks)
- (h) Explain the pathogenesis of his bone pain and polyuria in relation to the identified excessive hormone.
(4 marks)
- (i) Describe the specific histopathological feature you would expect to see if the mass identified on the Sestamibi scan were surgically removed and examined.
(2 marks)
- (j) Suggest one (1) surgical and one (1) pharmacological treatment option for this endocrine condition.
(2 marks)

END OF EXAMINATION PAPER

