



Higher Specialist Diploma

Clinical Chemistry

September 2025

Short Answer Questions

60 minutes

Attempt all Four Questions

Instructions to Candidates

1. Record your candidate number and HSD discipline on the front sheet of the answer booklet.
2. Record your candidate number, the question number and the page number in the spaces provided on the answer sheets.
3. Begin each new answer on a new page.
4. Each question is worth 25 marks.

1. A clinician phones the laboratory because they suspect some recently released biochemistry results to be discrepant. Describe the actions that you would take next.
2. You have been asked to provide a tutorial on the use of chromatographic techniques in the biochemistry laboratory to a group of specialist portfolio and STP trainees. Provide a brief description of the key learning outcomes and terminology you consider important in this tutorial.
3. While reviewing liver function tests on a patient, you notice an elevated ALP result. What are the possible causes of this and how should this be investigated?
4. Describe the clinical features and biochemical investigation of suspected subarachnoid haemorrhage. Include reference to limitations of investigations.



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Essay Paper

120 minutes

Attempt 2 out of 5 Questions

Instructions to Candidates

1. Record your candidate number and HSD discipline on the front sheet of the answer booklet
2. Record your candidate number, the question number and the page number in the spaces provided on the answer sheets
3. Begin each new answer on a new page
4. Each question is worth 100 marks

1. Critically evaluate the role of infection biomarkers in the diagnosis and management of sepsis.
2. Critically review the role of immunoassay techniques in the clinical biochemistry laboratory.
3. Critically discuss the principles and methodologies used in the clinical biochemistry laboratory for the diagnosis and monitoring of lipid disorders.
4. Critically compare the use of quantitative versus qualitative Faecal Immunochemical Testing in colorectal cancer screening and diagnosis.
5. Critically discuss the contribution of clinical biochemistry laboratories to the diagnosis, risk stratification, and monitoring of multiple myeloma.



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Case Studies

120 minutes

Attempt all Case Studies

Instructions to Candidates

1. Record your candidate number and HSD discipline on the front sheet of the answer booklet.
2. Record your candidate number, the question number and the page number in the spaces provided on the answer sheets.
3. Begin each new case study on a new page.
4. Each case study is worth 100 marks.
5. For these case study questions you are strongly advised to answer the questions as they arise during the case study to avoid later information impacting adversely on your answers to the earlier questions by presuming an "outcome".

Seen Case Study

1.

A hormone profile request was received by the laboratory. The patient is 27 years old and has been identified as male on the request form. This patient is currently receiving topical oestrogen as part of feminizing hormone therapy. Results in Table 1 were obtained from a sample taken in the morning at a GP appointment.

Result Table 1

Test	Result	Reference Range	Units
FSH	1.6	1.5-12.4	IU/L
LH	3.7	1.7 – 8.6	IU/L
Progesterone	<1.0	0.2 – 0.5	nmol/L
Oestradiol	473	95 - 233	pmol/L

a. Describe the role of oestradiol in males. (10 marks)

b. Identify potential causes for increased endogenous oestradiol production. (10 marks)

The following results in Result Table 2 were received later the same day, taken by a district nurse. Checks of sample identification and technical checks were complete.

Result Table 2

Test	Result	Reference Range	Units
FSH	1.7	1.5-12.4	IU/L
LH	4.4	1.7 – 8.6	IU/L
Progesterone	<1.0	0.2 – 0.5	nmol/L
Oestradiol	1248	95 - 233	pmol/L

c. Explain what could account for the increase in oestradiol from the AM and PM samples. (10 marks)

d. What effects could be expected when a biological male is treated with oestradiol? (20 marks)

e. Describe the hormonal control of testosterone in biological males. (20 marks)

f. Critically discuss the use of reference ranges for reproductive hormones (for both male and females). (30 marks)

Unseen Case Studies

2.

A 64 year old female, who recently began chemotherapy, was brought into the Emergency Department with dysrhythmia and following a seizure. A blood sample was taken, with the results below.

Test	Result	Reference Range	Units
Sodium	133	132-144	mmol/L
Potassium	6.2	3.2-4.8	mmol/L
Chloride	93	95-108	mmol/L
Bicarbonate	22-	22-29	mmol/L
Urea	11.1	3.0-8.0	mmol/L
Creatinine	223 *AKIN 2	60-120	µmol/L
Calcium	1.85	2.12-2.60	mmol/L
Corrected calcium	1.99	2.12-2.60	mmol/L
Albumin	40	35-50	g/L
Phosphate	1.90	0.80-1.50	mmol/L
Uric Acid	482	200-430	umol/L

- a. Comment on the above results. (10 marks)
- b. What is the most likely cause of the above results? Justify your answer using the results. (20 marks)
- c. Explain how the cause identified may be responsible for the Acute Kidney Injury. (15 marks)
- d. Describe potential causes of an Acute Kidney Injury. (30 marks)

Two days later a sample was received for Uric Acid. 'On Rasburicase' was written on the request form. As there was a change in results from previous, the test was immediately re-run.

Test	Result	Reference Range	Units
Uric Acid (First Run)	42	200-430	umol/L
Uric Acid (Re - Run)	30	200-430	umol/L

- e. Explain the cause for the difference in results for uric acid that have occurred between the two samples and also between measurements on the same sample. (15 marks)
- f. How will a valid Uric Acid result be obtained? (10 marks)

3.

A 35 year old man presents to his GP with a three month intermittent history of abdominal pain, blood in his stools and diarrhoea. The patient also complained of feeling feverish and of tiredness/fatigue. Following an endoscopy and other investigations, a diagnosis of ulcerative colitis was made. Initial laboratory investigations gave the following results;

Test	Result	Reference Range	Units
Sodium	137	135 – 145	mmol/L
Potassium	2.9	3.3 – 4.9	mmol/L
Urea	8.1	2.6 – 6.7 m	mmol/L
Creatinine	80	60 – 125	µmol/L
CRP	82	< 10	mg/L
ESR	25	< 7	mm/hour
Hb	112	130 – 180	g/L
MCV	75	80 – 100	fL
MCHC	290	330 – 360	g/L
WCC	15.8	4.3 – 10.8	$10^9/L$

a. Explain the significance of the results, shown in the table above. (20 marks)

The patient was put on a course of prednisolone which was initially successful in controlling symptoms. After 6 months the patient was found to have raised blood glucose levels.

b. How do steroids affect blood glucose levels? (10 marks)

c. What are the criteria for a diagnosis of diabetes? (10 marks)

d. Which High-Risk Groups that do not have diabetes are more likely to develop hyperglycaemia when put on steroid therapy? (10 marks)

e. Describe how steroid-induced diabetes could initially be treated. (5 marks)

f. How would you treat this individual if this initial treatment option fails? (15 marks)

After a further 6 months the patient's symptoms returned, and it was decided to start treatment with azathioprine.

g. Explain how azathioprine works against this disease. What investigation should be carried out before starting azathioprine, (and what information does this give)? (20 marks)

h. What are the potential side effects of azathioprine, and how may these be monitored? (10 marks)