Australian Institute of
Medical and Clinical Scientists (AIMS)

FELLOWSHIP EXAMINATION example

Name:

Candidate No:

GENERAL

Compulsory Module GEN II

(Acute and Routine Clinical Chemistry)

INSTRUCTIONS TO CANDIDATE

Time allowed is three (3) hours

Answers should be written in the answer book provided, writing on the right-hand page only leaving the margin blank. The facing page may be used for rough work if desired

The examination consists of:

- 2 essay style questions; each question is worth 35 marks.
  (Allow approximately 30 mins each)
- 20 short answer questions; each question is worth 5 marks.

Time allowed for writing is three (3) hours. There is an additional initial reading time of 15 minutes during which notes only may be written on the examination paper but no writing in the examination answer books is permitted at this time.
Candidates may attempt either the essay questions or the short answer questions first.

No papers or books of any kind may be taken into the examination room. No electronic devices of any type* are to be taken in to or accessed in the examination room. A non-programmable calculator only is permitted.

*This includes, but is not restricted to: phones, iPads, iPods, eBook readers, MP3 players, memory sticks (flash drives) and WiFi enabled devices of all types.

THE EXAMINATION PAPER MAY NOT BE REMOVED FROM THE EXAMINATION ROOM

ESSAY ANSWER QUESTIONS

2 Questions - each question is worth 35 marks. Time allocated to each question should not exceed 35 minutes. All questions should be attempted

1. Laboratory errors may occur in the pre-analytical, analytical and post analytical phase. Using examples, discuss the types of errors that may occur and outline how you would minimise the errors in each phase.

2. The Emergency department ring to discuss a result on a patient who has had several admissions over the past week and a consistently repeated NEGATIVE-POCT urine pregnancy test result. The laboratory reported a quantitative result of 320,000 IU/L. What are the reasons for the discrepancy?

   In your answer consider:
   a) Possible reasons for the discrepancy, the limitations of POCT devices, and how you would investigate the cause of this discrepancy.
   b) The significance of the very high Quantitative HCG result and the differentiation of Normal pregnancy from Pathological states such as Hydatidiform moles.
   c) The role of factors such as Human anti mouse antibodies (HAMA) and atypical HCGs.

SHORT ANSWER QUESTIONS

20 Questions - each question is worth 5 marks. Time allocated to each question should not exceed 5 minutes. All questions should be attempted

1. Outline the common causes of and significant laboratory results seen in a Metabolic Acidosis and briefly describe the compensatory mechanisms induced in an attempt to bring the blood pH back to normal.

2. Discuss the nature of Human-Anti-Mouse-Antibodies (HAMA) and the mechanism of their interference in immunological tests.

3. Discuss one method for the measurement of serum total calcium including pre-analytical factors, analytical principles, and interferences.

4. Define the Rumack-Matthew nonogram and its utility in assessing Paracetamol toxicity.

5. What factors during the sample collection process result in haemolysis? List commonly affected analytes including why and how they are affected by haemolysis.

6. Beers law describes an ideal relationship between the concentration of an analyte and the amount of radiant energy absorbed. Define Beers Law, including a description of the variables and under what circumstance will deviations from Beers law occur.

7. Discuss the advantages and disadvantages of reporting the eGFR.

8. Sources of pharmokinetic variability and their potential impact therapeutic drug monitoring.

9. Discuss the clinical significance of urinary albumin in monitoring of the Diabetic patient.

10. Discuss the differential diagnosis and the laboratory investigation of a 42-year old male with a serum Alanine aminotransaminase (ALT) level of 255 U/L.

11. A 24-year old man with no significant past medical history presents with an episode of mild jaundice. His liver function tests are normal apart from a Bilirubin of 52 µmol/L. There is no bilirubinuria. Discuss the possible causes of this result and how they may be confirmed or excluded.

12. Describe the analytical principles of one method for the measurements of the following.
    a) Serum creatinine
    b) Lactate dehydrogenase (LD)
    c) Uric acid

13. List the common Westgard rules and briefly discuss their application and use in the clinical laboratory.
14. The following serum results were obtained on a comatose patient in the Emergency department;

Na	134 mmol/L
K	4.2 mmol/L
Cl	109 mmol/L
HCO3	20 mmol/L
Creatinine	96 umol/L
Urea	4.6 mmol/L
Glucose	4.3 mmol/L
Osmolality	325 mOsmol/kg.

    Is the osmolality consistent with the electrolyte results? Why? Discuss the possibilities.

15. A 10-year-old Child presents with diabetic ketoacidosis and has the following serum chemistry findings.

Na	130 mmol/L
K	6.4 mmol/L
Urea	23.5 mmol/L
Creatinine	126 µmol/L
Glucose	32 mmol/L

    Discuss these results.

16. A clinician complains that POCT glucose measurements are different to laboratory results. Discuss how you would respond.

17. Outline the measurement and clinical significance of Total Globulins. Discuss the laboratory investigations that would follow for a 65 year old woman with a Total Protein of 86 g/L and an Albumin of 30 g/L.

18. Describe the lipoprotein particles commonly measured and their relevance to cardiovascular disease.

19. When measuring electrolytes by direct and indirect ion selective electrodes significant difference can be observed discuss the potential causes.

20. You field a telephone call from a client who needs to undertake an oral glucose tolerance test asking what she needs to do. Outline what you would tell her.

END OF EXAMINATION