AUSTRALIAN INSTITUTE OF MEDICAL SCIENTISTS
AIMS Professional Examination

EXAMINATION PACK

This pack contains:

- Guidelines for the AIMS Professional Examination
- Study Guide for the AIMS Professional Examination
- List of Examination Venues
- AIMS Professional Examination Rules
- Sample AIMS Professional Examination Questions
The AIMS Professional Examination
The AIMS Professional Examination is a written short answer paper of three (3) hours, conducted twice a year in March and September in a number of venues in Australia and overseas. The examination consists of the following sections:

- Chemical Pathology  22 marks
- Haematology    22 marks
- Medical Microbiology   22 marks
- Transfusion Science   22 marks
- Anatomical Pathology  12 marks
- Total    100 marks

The examination is a three (3) hour short answer paper and is set at the level expected of a professional Medical Laboratory Scientist with at least two years post graduate experience. All sections are compulsory. To pass the Examination candidates must obtain a total of 50% or more, with a pass of at least 50% in each section. Completed examinations are not released under any circumstances

Applicants who are successful in the Examination will be classified as suitable for the occupation of Medical Laboratory Scientist ANZSCO 234611.

Please note if you have not completed Stage 1 of your assessment of professional skills and qualifications then you are not able to apply for the professional examination. For further information, please contact the AIMS National Office.

AIMS Professional Examination Application Deadlines
You must apply in writing to sit the AIMS Professional Examination using the application form provided in the examination pack with the Stage 1 Skills Assessment Results Letter. Closing dates to receive this application form are:

- 1 December for the March Examination
- 1 June for the September Examination

Hardcopy applications to sit the Examination must be received no later than 4pm on the specified date.

You should receive notification of your examination and venue by:

- The second week of February (for March examinations)
- The second week of August (for September examinations)

If you do not receive notification by 15 February (March examination) or 15 August (September examination) please contact us immediately.

Enrolment deferral
A request to defer enrolment to the next examination session must be sent in writing to contact@aims.org.au prior to the application deadline for the current examination session. For example, an applicant enrolled in the March examination wishing to defer to the September examination must submit a deferral request prior to the March enrolment deadline (1 December). Requests received after the enrolment deadline will not be accepted.

Once a deferral request has been received, an applicant will be asked to submit a new application form (with one (1) passport sized photograph) for the next examination session. This application must be received prior to the expiration of the three (3) year validity period stated on the applicant’s Stage 1 Skills Assessment Results Letter.

The examination deferral fee can be found on the AIMS website. Examination fees will not be refunded.
**English Language Requirement**
Applicants do not need to supply an English Proficiency Test Report for a second time provided the application for the AIMS Professional Examination is received within **three (3)** years of the date of the applicant’s Stage 1 Skills Assessment Results Letter.

**Photographs and Candidate Identification**
Please attach one (1) passport sized photograph to the application form.
Acceptable IDs for the candidates sitting examinations will be as follows:

A. Candidates sitting in Australia or New Zealand will need to provide one of the following:
   - Passport or
   - Australian/NZ driver’s licence

B. Candidates sitting overseas will need to provide one of the following:
   - Passport or
   - Government issued overseas driver’s licence (with photo)

The invigilators will only allow the candidate to sit the exam if the candidate photo matches the photo on the ID that the candidate presents.

**Fees**
All Fees are in Australian Dollars and are non-refundable. See the AIMS website for current fees.

**How to Lodge Your Examination Application**
Post your hardcopy completed application form to:

**Postal address**
Australian Institute of Medical Scientists
PO Box 1911
MILTON QLD 4064 AUSTRALIA

**Courier address**
Australian Institute of Medical Scientists
Unit 7 / 31 Black Street
MILTON QLD 4064 AUSTRALIA

**Checklist**
- Complete application form with the declaration signed in ink
- Complete payment information or enclose a cheque / money order or draft
- Attach one (1) passport sized recent photograph

**Results**
It will take up to ten (10) weeks to receive your professional examination result. Results will be given as either a PASS or FAIL. Exact marks will not be given.

**Re-mark**
Candidates have 21 days from the date of the results letter to request a remark of their examination paper. Requests must be sent in writing to contact@aims.org.au. See the AIMS website for the current remark fee.

When a candidate requests a re-mark of a professional examination paper this will be performed by an independent marker, that is a marker different from the original marker.

The **average** of the original mark and the re-mark shall be the final result for the candidate. If the disparity between the marks exceeds 12% a third marker will be consulted to address this discrepancy.

**Further Information**

**Telephone** +61 7 3876 2988  
**Facsimile** +61 7 3876 2999  
**Email** contact@aims.org.au  
**Website** www.aims.org.au
The AIMS Professional Examination

The AIMS Professional Examination will be held in centres in Australia and other countries twice yearly, in March and September.

The examination is a three (3) hour short answer paper and is set at the level expected of a professional medical scientist with at least two years post graduate experience. All questions must be attempted.

The examination is divided into five sections:

- Chemical Pathology  22 marks
- Haematology  22 marks
- Medical Microbiology  22 marks
- Transfusion Science  22 marks
- Anatomical Pathology  12 marks
- **Total  100 marks**

To pass the AIMS Professional examination, candidates must obtain an overall total of 50%, with a pass of at least 50% in each section.

Major Areas of Knowledge

The major areas of knowledge expected of candidates are as follows:

**Chemical Pathology**

An understanding of the underlying techniques utilised and methodology behind the measurement of common chemistry analytes and their clinical utility including:

- Blood gas and electrolytes measurement
- Urea, creatinine, and creatinine clearance, uric acid
- Glucose, glucose tolerance, HbA1c
- Liver function tests
- Lipid analysis
- Thyroid function tests
- Adrenal function tests
- Plasma proteins and protein electrophoresis
- Specific plasma proteins e.g. CRP
- Principles of enzyme assays.
- Enzyme tests e.g. amylase, creatine kinase
- Calcium, phosphates, magnesium
- Bilirubin including neonatal bilirubin measurement
- Myocardial function tests.
- Common tumour markers e.g. Prostatic specific antigen, CEA
- Basic virology tests now performed in core lab settings
- Point of care testing
**Medical Microbiology**
- A basic knowledge of infectious diseases and organisms most commonly associated with these diseases. There will be a greater emphasis on bacterial diseases, but some knowledge of parasitic, fungal and viral disease is also expected.
- Collection, handling and processing of samples including the minimal criteria for acceptance of samples
- Presumptive identification of major groups of bacteria based on microscopic and colonial morphology on a variety of common media and the use of key basic identification test such as catalase, oxidase and atmospheric growth requirements.
- Principles of major methods of susceptibility testing i.e. disc diffusion, agar dilution and broth dilution and the relationship between breakpoints, MIC and susceptible/resistant categories.
- General principles of Quality Control.
- Microscopy:
  - Function and maintenance of a modern binocular microscope, including setting up and using for bright field, phase contrast and darkfield microscopy.
- Staining techniques:
  - Gram stain
  - Ziehl Neelsen
- Knowledge of Normal Flora (indigenous flora) of major body sites or absence of normal flora in sterile body sites.

**Haematology**
- Principles of automated cell counting
- Macrocytic anaemia
- Microcytic anaemia
- Normocytic anaemia
- Myeloproliferative disorders
- Lymphoproliferative disorders
- Production of erythrocytes, leucocytes and platelets
- Iron metabolism
- Intrinsic and extrinsic coagulation pathways and methods of testing
- Bleeding disorders
- Anticoagulant therapy and methods of monitoring this therapy
- Natural anticoagulants
- Fibrinolysis.

**Transfusion Science**
- Antibody structure and function
- Antibody production
- Blood donation testing
- Blood components
- Blood group systems
- Antibody detection and identification
- Pre transfusion testing
- Quality assurance in the blood bank laboratory
- Antigen/antibody interaction.

**Anatomical Pathology**
- Preparation of specimens for light microscopy including fixation and tissue processing, decalcification technique and general staining methods such as Haematoxylin and Eosin stain, Van Gieson stain and Masson’s Trichrome stain.
- Normal histology especially basic tissue types
- Histochemical methods as applied to light microscopy such as PAS and Perls’ Prussian Blue for Iron.
- Fixation of cytological specimens
- The Papanicolaou staining technique
- The cytological features of inflammation and neoplasia in cervical smears
- Normal cell types in cytological specimens

**Laboratory Safety and Quality Control**
- Safe handling of biological specimens
- Safe handling of hazardous chemicals
- Sterilisation and disinfection procedures
- Handling of infectious specimens

**Principles of quality assurance and quality control**
- Basic charting and rules for rejection of results.
- Simple statistical evaluation. Reference ranges methodology – parametric and non parametric
- The role of internal quality control and external quality assurance
- Uncertainty of measurement

**Basic Laboratory Procedures and equipment**
- Normal and Molar solutions
- Basic laboratory calculations
- Basic laboratory equipment and its appropriate use
- Spectrophotometry
- Immunoassay

**Recommended Reading List**

Any edition of the texts below from the last 10 years would be suitable.

1. Bailey & Scott’s Diagnostic Microbiology 14th Ed.  
   Tille P., 2015, Elsevier Health Sciences (available as an E book)

   James H. Jorgensen (Editor In Chief), Michael A. Pfaller (Editor In Chief), 2015  American Society for Microbiology.

3. Dacie and Lewis Practical Haematology 12th Ed.  
   Bain Barbara J, Churchill Livingstone, 2016. Elsevier Health Sciences

4. Hoffbrand’s Essential Haematology 7th Ed.  
   Hoffbrand A.V., Moss P.A.H., 2016

5. Microscopic Haematology 3rd Ed.  
   Rosenberg G., 2011. Elsevier Health Sciences

   Fung, M.K., MD, PhD; Anne F. Eder, MD, PhD; Steven Spitalnik, MD; and Connie M. Westhoff, PhD, MT(ASCP)SBB 2017.

   Harmening D., 2018. FA Davis company.

   Daniels, G, and Bromilow, l., 2013. Wiley (ebook available)

9. ANZSBT Guidelines for Transfusion and Immunohaematology Laboratory Practice 1st Ed.  
   2016 can be downloaded from https://anzsbt.org.au (free)
10. **Textbook of Diagnostic Cytology**

11. **Cytology: Diagnostic Principles and Clinical Correlates** 4th Ed.
    Cibas, E.S. and Ducatman B.S., 2014. Elsevier

12. **Diagnostic Pathology: Cytopathology** 2nd Ed.
    Dina Mody, Michael J. Thrall, Savitri Krishnamurthy, 2018. Elsevier

13. **Cellular Pathology, 3rd Ed.** An Introduction to Techniques and Applications


15. **Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics** 7th Ed.

16. **Clinical Chemistry** 5th Ed.

**Useful Websites**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ANZSBT</td>
<td><a href="https://anzsbt.org.au/">https://anzsbt.org.au/</a></td>
<td></td>
</tr>
<tr>
<td>The Blood Bank Guy</td>
<td><a href="https://www.bbguy.org/">https://www.bbguy.org/</a></td>
<td></td>
</tr>
<tr>
<td>Mycology on line</td>
<td><a href="http://www.mycology.adelaide.edu.au">www.mycology.adelaide.edu.au</a></td>
<td>Excellent Australian site dealing with fungi.</td>
</tr>
<tr>
<td>RCPA Lab tests online</td>
<td><a href="https://labtestsonline.org.au">https://labtestsonline.org.au</a></td>
<td>Produced by the AACB in collaboration with AACC and RCPA. This site offers up-to-date information about laboratory tests and how they are used.</td>
</tr>
<tr>
<td>RCPA</td>
<td><a href="https://www.rcpa.edu.au/Library">https://www.rcpa.edu.au/Library</a></td>
<td></td>
</tr>
<tr>
<td>AIMS</td>
<td><a href="http://www.aims.org.au">www.aims.org.au</a></td>
<td></td>
</tr>
<tr>
<td>ASM (US)</td>
<td><a href="http://www.asm.org">www.asm.org</a></td>
<td>Useful content. Subscription access to current journals older content may be free.</td>
</tr>
<tr>
<td>ASM (Australia)</td>
<td><a href="http://www.theasm.org.au">www.theasm.org.au</a></td>
<td></td>
</tr>
<tr>
<td>NATA</td>
<td><a href="https://www.nata.com.au">https://www.nata.com.au</a></td>
<td>Laboratory policy and requirements.</td>
</tr>
<tr>
<td>AACB</td>
<td><a href="https://www.aacb.asn.au">https://www.aacb.asn.au</a></td>
<td>Member access required for full access. Open access to some very useful material</td>
</tr>
<tr>
<td>AACC</td>
<td><a href="https://www.aacc.org/">https://www.aacc.org/</a></td>
<td>Member access required for full access. Open access to some very useful material</td>
</tr>
</tbody>
</table>
**PROFESSIONAL EXAMINATION VENUES**

<table>
<thead>
<tr>
<th>REGION</th>
<th>TOWN</th>
<th>TIME DIFFERENCE (Hours)</th>
<th>COUNTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>Athens</td>
<td>-8</td>
<td>Greece</td>
</tr>
<tr>
<td></td>
<td>London</td>
<td>-10</td>
<td>England</td>
</tr>
<tr>
<td>Middle East</td>
<td>Dubai</td>
<td>-6</td>
<td>United Arab Emirates</td>
</tr>
<tr>
<td></td>
<td>Riyadh</td>
<td>-7</td>
<td>Saudi Arabia</td>
</tr>
<tr>
<td>Sub Continent</td>
<td>New Delhi</td>
<td>-4.5</td>
<td>India</td>
</tr>
<tr>
<td>Africa</td>
<td>Johannesburg</td>
<td>-8</td>
<td>South Africa</td>
</tr>
<tr>
<td>Asia</td>
<td>Hong Kong</td>
<td>-2</td>
<td>China</td>
</tr>
<tr>
<td></td>
<td>Manila</td>
<td>-2</td>
<td>Philippines</td>
</tr>
<tr>
<td></td>
<td>Singapore</td>
<td>-2</td>
<td>Singapore</td>
</tr>
<tr>
<td>Pacific</td>
<td>Auckland</td>
<td>2</td>
<td>New Zealand</td>
</tr>
<tr>
<td></td>
<td>Christchurch</td>
<td>2</td>
<td>New Zealand</td>
</tr>
<tr>
<td>Australia</td>
<td>Adelaide</td>
<td>SA -0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brisbane</td>
<td>QLD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Canberra</td>
<td>ACT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Darwin</td>
<td>NT -0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hobart</td>
<td>TAS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Melbourne</td>
<td>VIC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perth</td>
<td>WA -2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sydney</td>
<td>NSW</td>
<td></td>
</tr>
</tbody>
</table>

Time difference based on AEST (Australian Eastern Standard Time)

Please note that venues may not be booked in all these locations for the one session - venues are booked depending on the constraints at a given time e.g., candidate numbers, political situations, particular request by profession etc.
AUSTRALIAN INSTITUTE OF MEDICAL SCIENTISTS
AIMS Professional Examination Rules

1. Every candidate shall fill in a verification of identity form. Candidates will display a form of photographic identification acceptable to the supervisor.

2. No candidate shall commence writing answers until authorised by the Chief Invigilator. All candidates shall cease writing when instructed by the supervisor. At the conclusion of the examination all students shall remain seated until all the examination papers have been collected.

3. No candidate will be permitted to enter the examination room after the published starting time.

4. No candidate shall leave the examination room before 30 minutes have elapsed from the published starting time or during the last 10 minutes of any examination.

5. During the examination a candidate may leave the examination room temporarily only with the consent of the supervisor, and shall be adequately supervised during this period.

6. Any candidate who wishes to leave the examination room temporarily must hand to the Chief Invigilator all examination material. The Chief Invigilator must endorse the material as correctly identifying the candidate.

7. A candidate must not take into the examination room any books, dictionaries, notes or other documents or devices except those authorised by the examiner. Mobile telephones should be turned off and placed with bags or handbags at the front of the examination room.

8. During the examination no candidate shall speak to or communicate with any other candidate.

9. No candidate shall in any way give assistance to, or receive assistance from, any other person during the examination.

10. No candidate shall bring into, or remove from, an examination room any examination answer booklet or examination attendance slip.

11. Any candidate who is detected breaching these examination procedures shall be guilty of misconduct.

12. If misconduct is detected at the time, the candidate will be informed that the misconduct will be reported and the invigilator will complete an incident report form. Where appropriate, for example where the candidate is disrupting the examination, the candidate may be summarily dismissed from the examination room.

13. Misconduct in examinations shall be reported in writing by the supervisor to the relevant professional body, which will conduct an investigation.

14. A candidate who is guilty of misconduct in an examination may be liable to have their examination paper declared null and void.

15. No other material or books, including pens, papers, highlighters, etc may be taken into the examination room. No paper may be removed from the examination room. A calculator will not be required for the AIMS Professional Examination. The examination may include simple arithmetic calculations.

16. Answers must be written using a pen.
Chemical Pathology

- List the three (3) factors in the collection of blood that can invalidate the result. (1.5 marks)

- Pre-analytical factors are particularly important when testing hormones. List three (3) causes of error that may only occur when measuring hormones. (1.5 marks)

- The Dexamethasone Suppression test is used to diagnose what conditions? (1 mark)

- List two (2) hormones that are useful in the investigation of female fertility. Explain Why. (1.5 marks)

- List three (3) enzymes that can be used to assess liver damage. (1.5 marks)

- What is the clinical significance of a PSA of 30 ng/mL? (1 mark)

- Comment on the possible consequence for a three (3) day old baby with an unconjugated bilirubin of 360 μmol/L. (1 mark)

- What is the difference between accuracy and precision? (1 mark)

- You are required to make 200mls of a 0.2 molar sodium hydroxide solution. How much sodium hydroxide do you need to make this solution? (1 mark)

- Define the following: (4 marks)
  - Zero Order kinetics
  - First Order kinetics
  - Osmolality
  - Euvolaemia

- What condition/s do the following results indicate? Give reasons for your comments. (4 marks)
  - ALP: 1150 U/L
    - GGT: 25 U/L
  - ALP: 89 U/L
    - GGT: 110 U/L
  - Ca: 1.89 mmol/L
    - PO4: 1.75 mmol/L
    - Albumin: 34 g/L
  - Sweat chloride: 75 mmol/L
• What do these results indicate? (1.5 marks)
  Total Bilirubin: 150 μmol/L
  Conjugated Bilirubin: 115 μmol/L
  AST: 540 U/L
  ALT: 300 U/L
  ALP: 750 U/L
  GGT: 510 U/L
  Albumin: 26 g/L

• Comment on these results. What do these results indicate? (1.5 marks)
  Sodium 125 mmol/L
  Potassium 4.6 mmol/L
  Chloride 103 mmol/L
  Bicarbonate 22 mmol/L

Anatomical Pathology

• Name two sites in the body lined by simple squamous epithelium. (1 mark)

• What percentage of dissolved formaldehyde gas is present in 10% formalin solution? (1 mark)

• Name two (2) types of microtomes. (1 mark)

• At what thickness are sections for routine paraffin cut? (1 mark)

• Name two (2) natural dyes. (1 mark)

• What is the standard (routine) stain for biological tissues? (1 mark)

• What is the usual fixative for cervical smears for cytological diagnosis? (1 mark)

• What type of epithelium lines the skin? (1 mark)

• What is the usual fixative for cervical smears for cytological examination? (1 mark)

• What is the most common embedding media used when processing tissues for light microscopy? (1 mark)

• What stain is normally used to highlight on tissue sections: (2 marks)
  a. Bacteria
  b. Fungi
  c. Mucin
  d. Haemosiderin
Medical Microbiology

- Name two (2) common bacterial causes of acute bacterial meningitis in adults. (2 marks)

- During urine microscopy, the numbers of which two (2) cell types are important in routinely diagnosing urinary tract infection? (1 mark)

- What is the Gram stain morphology of the following organisms: (2 marks)
  a. *Staphylococcus aureus*
  b. *Haemophilus influenzae*
  c. *Klebsiella pneumoniae*.
  d. *Corynebacterium diphtheriae*.

- In relation to antibiotic sensitivity testing, what does the term MIC stand for? (1 mark)

- For what is VRE an abbreviation? (1 mark)

- If you have run out of carbon dioxide generating sachets, how else can you easily create a similar atmosphere? (1 mark)

- What type of haemolysis do you associate with the following organisms: (2 marks)
  a. *Streptococcus pyogenes*
  b. *Streptococcus pneumoniae*
  c. *Streptococcus agalactiae* (Group B *Streptococcus*)
  d. *Aeromonas hydrophila*

- With which respiratory pathogen do you associate the Ziehl-Neelsen stain? (1 mark)

- Name a faecal pathogen detected by screening faeces for non lactose fermenting organisms. (1 mark)

- In a Gram stained smear of a vaginal swab, what is the probable identity of large Gram positive bacilli? (1 mark)

- List the four (4) reagents of the Gram stain in the order in which they are used. (2 marks)

- Name two (2) methods for creating an anaerobic atmosphere in a jar. (2 marks)

- With which pathogenic organism do you associate each of the following diagnostic discs: (2 marks)
  a. Opcotolin
  b. Novobiocin
  c. X and V factors
  d. Bacitain

- What blood cell is mainly responsible for eliminating a bacterial infection? (1 mark)
Transfusion Science

• What are the storage requirements for platelet concentrates? (1 mark)

• What is Column Agglutination Technology (CAT) and what is it used for? (1 mark)

• Give two (2) examples where mixed-field agglutination may be seen. (2 marks)

• Which is the most common ABO blood group in Australia? (1 mark)

• What is FFP and what is it used for? (1 mark)

• Blood of which type is usually available for emergency transfusion? (1 mark)

• List four (4) causes of anomalous results in ABO and/or Rhesus blood grouping reactions. (4 marks)

• What percentage of people in the Australian population are D positive? (1 mark)

• What is the optimal temperature for storage of liquid red cells products prior to transfusion? (1 mark)

• How should a sample for crossmatching blood be labelled? (2 marks)

• What anticoagulant is used in donor units of blood? (1 mark)

• What is the difference between the Groups A1 and A2 on a routine blood grouping? (1 mark)

• What blood group is known as the universal recipient? (1 mark)

• List two (2) clinically significant antibodies other than anti D. (2 marks)

• Blood groups can be performed on tiles and in test tubes. List two (2) other ways of performing blood groups. (2 marks)
Haematology

• What effect could cold agglutinin disease have on a routine full blood count? (1 mark)

• What does the D-Dimer test indicate? (1 mark)

• What test would you use to distinguish Auto-Immune Haemolytic Anaemia from Hereditary Spherocytosis? (1 mark)

• Glucose-6-phosphate dehydrogenase deficiency can lead to which haematological syndrome? (1 mark)

• The red cell distribution width (RDW) has become a very useful calculated measurement in haematology. How is it calculated? (1 mark)

• List two (2) causes of macrocytosis and one test other than the FBC that may be used to distinguish between these causes. (2 marks)

• Name one (1) condition associated with each of the following morphological abnormalities: (2 marks)
  a. Howell-Jolly bodies
  b. toxic granulation
  c. Stomatocytes
  d. Auer rods

• Name the white blood cell which is normally found in greatest numbers in the peripheral circulation of a four (4) year old child? (1 mark)

• Why is the haemoglobin of a patient with chronic renal failure usually low? (1 mark)

• What is meant by the term "left-shift"? (1 mark)

• A patient has a prolonged PT, APTT, TCT and marked thrombocytopenia. Give two (2) possible causes of these results. (2 marks)

• Your routine coagulation QC material suddenly gives abnormal results. What would you do? (2 marks)

• Explain why EDTA anticoagulated blood CANNOT be used for the measurement of the Activated Partial Thromboplastin Time? (2 marks)

• What are reticulocytes? Why do we count them? (2 marks)

• What affect does lipeamia have on the measurement of haemoglobin? (1 mark)

• When a haematology analyser does a delta check, what is it checking? (1 mark)