



AUSTRALIAN INSTITUTE OF MEDICAL SCIENTISTS (AIMS)

FELLOWSHIP EXAMINATION

Name:

Candidate no:

MICROBIOLOGY

Compulsory Module I (Medical Microbiology)

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 QUESTIONS

Each question is worth 35 marks. Suggested time allocation is 30 minutes per question.

Essay questions (35 marks each)

- A. Discuss the laboratory detection of Bacteraemia under the following headings.
- 1) Sample collection: consider timing of collection, volume of blood, number of bottles.
 - 2) Discuss instrument-based systems such as BACTEC and BacT/ALERT
 - 3) Discuss the laboratory processing of positive cultures
 - 4) Discuss options for accelerated reporting of positive blood culture results including microbial identification and direct susceptibility results.
- B. Matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI- TOF MS) has been introduced into a number of routine clinical microbiology laboratories.
- 1) Principle of operation of MALDI-TOF MS.
 - 2) Discuss application of MALDI-TOF MS to the identification of microbial isolates.
 - a) What are the strengths and limitations?
 - b) Discuss the variations of pre analytical processing for various organism groups and impact on microbiology workflow.
 - c) Discuss the direct identification of organisms from clinical specimens, such as urine and blood culture.

SHORT ANSWER QUESTIONS

Write brief notes/comments on the following questions and statements. Each question and statement is worth 5 marks. Suggested time allocation is 5 minutes per question.

- Q1. Briefly discuss the epidemiology and laboratory investigation and identification of *listeria monocytogenes*.
- Q2. What is the gene responsible for conferring Methicillin resistance on *Staph aureus* and what is the product of that gene? What is the genetic element on which this gene is located? To which antibiotic groups does it confer resistance?
- Q3. Discuss the Mechanism of action, Spectrum of activity and the Clinical uses of the Polymyxin class of antibiotics.
- Q4. List Four (4) resistance mechanisms that have been described in Multidrug resistant *Acinetobacter baumannii*.
- Q5. What diseases are associated with the following *Chlamydia* species?
a) *Chlamydia psittaci*
b) *Chlamydia trachomatis*
c) *Chlamydia Trachomatis* serovars L1, L2, L2a, L3
d) *Chlamydia pneumoniae*
- Q6. Describe the procedure for the CAMP Test. Which organisms are CAMP test positive.
- Q7. What organism/s are usually associated with the following diseases or event?
a) Feral pig hunting.
b) Epiglottitis.
c) A human bite
d) Lemierre's syndrome.
e) Septic arthritis in children.
f) An injury occurring in a fresh water creek
- Q8. Describe the principle behind the following media, indicate key components of the media.
a) XLD agar
b) McConkey agar
c) Thayer Martin agar
d) Mannitol Salt agar
e) BYCE agar
- Q9. What cultural, morphological and biochemical features can allow presumptive identification of the following bacteria.
a) *Clostridium perfringens*
b) *Erysipelothrix rhusiopathiae*
c) *Eikenella corrodens*
d) *Moraxella catarrhalis*
e) *Aeromonas hydrophilia*

- Q10. Briefly discuss the laboratory diagnosis of *Bordetella pertussis*.
- Q12. Outline the procedure for screening women at for *Group B Streptococcus* colonization at 35-37 weeks gestation. Why is screening done? What samples are recommended?
- Q13. Briefly describe the principles of phase-contrast microscopy. When and why would phase-contrast microscopy be used?
- Q14. An elderly man presents to the emergency department with a chronic cough, shortness of breath, weight loss and X rays shows evidence of pneumonia. The Clinician requests microscopy and culture for Tuberculosis. Briefly outline the procedure for the laboratory investigation of sputum samples including staining, culture, and susceptibility testing.
- What are the relative sensitivities of ZN/Acridine Orange staining, Culture and Molecular methods?
- Q15. Briefly describe the diseases of humans caused by *Bacillus cereus* and how *B. cereus* may be differentiated from other *Bacillus sp.*
- Q16. A CSF sample was taken in the emergency department of a regional hospital. Describe how this sample would be processed and how the process would be modified depending upon the findings.
- Q17. Briefly discuss the epidemiology and spectrum of disease caused by *H. influenzae*. Outline procedures for isolation and identification.
- Q18. A 50-year-old lady develops a liver abscess six weeks following a traumatic dental procedure. A 3+ growth of small weakly beta haemolytic colony with a caramel odour was grown. The isolate was gram positive cocci, catalase negative, and typed as Group F. Discuss the possible identification of the isolate, tests that could be employed to confirm the identification and susceptibility testing.
- Q19. Describe the Gram stain appearance of the following bacteria.
- a) *Capnocytophaga spp.*
 - b) *Micrococcus spp.*
 - c) *Nocardia braziliensis*
 - d) *Clostridium perfringens*
 - e) *Fusobacterium nucleatum*
- Q20. Discuss the laboratory investigation on a sputum sample from a patient with Cystic fibrosis who is producing purulent sputum.

The End of the Examination