AUSTRALIAN INSTITUTE
OF MEDICAL SCIENTISTS (AIMS)

FELLOWSHIP EXAMINATION Sample exam paper

ID No:

MICROBIOLOGY

Compulsory Module MICRO II
(Serology and Molecular Biology)

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)

Q1. As head of a high throughput laboratory, you are responsible for the purchase of an instrument to perform general infectious disease serology testing. Discuss the factors you would consider in making your choice of instrument.

Q2. Lyme borreliosis is a disease more commonly found in the northern hemisphere. Australians traveling to endemic areas may acquire Lyme disease.

There are a small group of Australians who claim to have Lyme disease despite not having travelled to endemic areas. Discuss the epidemiology of Lyme disease and the laboratory investigation of Australians suspected of having Lyme disease.

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 describe the principles of haemaglutination inhibition tests.

Q2. How does a complement fixation test (CFT) work? What are the advantages and disadvantages of the CFT?

Q3. In relation to serological/and molecular tests define the following terms

a) Sensitivity
b) Specificity
c) Positive predictive value
d) Negative predictive value

Q4. Lateral flow tests are widely used in the point of care (PoCT) setting and as screening tests. Briefly outline the principle of lateral flow assay.

Q5. Several point of care (PoCT) nucleic acid tests (NAT) for infectious disease testing have recently been released. Describe the advantages and disadvantages of PoCT NAT.

Q6. Patients tested for hepatitis B virus infection had the following serological profiles. Briefly describe the most likely clinical state or cause of each profile.

Profile	HBsAg	anti-HBcTotal	HBsAb (mIU/mL)	HBcIgM	HBeAg	HBeAb
Patient 1	Pos	Pos	<10	Pos	Pos	Neg
Patient 2	Neg	Pos	180	Neg	Neg	Pos
Patient 3	Neg	Neg	85	Neg	Neg	Neg
Patient 4	Pos	Neg	Neg	Neg	Neg	Neg
Patient 5	Neg	Pos	Neg	Neg	Neg	Neg

Q7. Describe the development of a typical antibody response after a viral infection.

Q8. Describe the production of a western blot assay. What is the role of the western blot assay in the investigation of infectious disease?

Q9. An inpatient in a paediatric ward was diagnosed with measles infection. What tests should be performed on those associated with the patient?

Q10. Describe the serological methods used to diagnose Rickettsial infection in Australia.

Q11. Briefly describe practical methods used by laboratories to minimise contamination of nucleic acid tests.

Q12. What is the principle of an avidity assay and what is the clinical utility of the test?

Q13. How does a serology neutralisation test work? Name two applications of a neutralisation test.

Q14 A four-month-old baby has been exposed to rubella virus. What investigations should be undertaken?

Q15. Briefly discuss the serological investigation of EBV infection.

Q16. Briefly describe HTLV infection; the distribution of infection, the disease(s) caused and the diagnosis of infection.

Q17. Describe different formats of enzyme immunoassays including their advantages.

Q18. Luminex/Bio-Plex assays have been recently introduced into diagnostic serology. Describe how they work and the advantages of these assays.

Q19. Briefly outline methods available for amplification of RNA targets.

Q20. A pregnant woman, from a Pacific Island where Yaws is endemic, was found to have a low reactive RPR. What further tests should be performed? How can Yaws be differentiated from venereal syphilis?

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END OF THE EXAMINATION