

Chittagong Veterinary and Animal Sciences University

MS in Microbiology

July-December Semester 2018

Subject: Molecular Microbiology

Corse Code: MMB-602

Total Marks: 40

Time: 2 hours

(Figures in the right margin indicate full marks. Answer any four questions)

- 1 a) What is the domain of life? What are the three domains of life and examples? 2+3
b) How do you define central dogma of biology? How does the central dogma connect DNA, RNA and protein? 2+3
- 2 Define following terms- 2×5=10
a) Gene and genome
b) Open Reading Frame (ORF)
c) Tandem repeat
d) CpG island
e) Exon and Intron
- 3 a) What is genomics and why do we study genomics? 2
b) Write down the name of four major next generation sequencing technologies. 2
c) What are the principal steps involved in next generation sequencing. 2
c) Following is an example of FASTQ file. There are four lines in this sequence file. What is the meaning of line-1, line-2, and line-4? 4
- ```
@SEQ_CVASU.102.11
GATTGGGGTTCAAAGCAGTATCGATCAAATAGTAAATCCATTG
+
!''*(((***+))%%%++)(%%%%).1***-+*'')**55CCF
```
- 4 a) What is typing of bacteria? Classify typing methods of microorganisms. 2+5  
b) What is the difference between pulsed field gel electrophoresis (PFGE) and whole genome sequencing (WGS)? 3
- 5 a) What is microbiome? 2  
b) What is metagenomic sequencing? What are the major steps involved in a metagenomic sequencing project? 6  
c) Differentiate between alpha and beta diversity. 2

Chittagong Veterinary and Animal Sciences University

MS in Microbiology Final Examination; July-December Semester, 2018

Course Title: Avian Microbes; Course Code: AMB-602

Full Marks: 40; Time – 2 hours

Answer any 4 (FOUR) questions

1. With the names of the disease conditions they can produce in chickens make a list of Gram positive bacterial pathogens. A flock of chickens is suffering from arthritis, and after a close examination, you have also seen wattle abscess developed in some of the birds. What would be your suspicion behind the disease problem and how can you confirm the disease by laboratory testing? 10
2. What are the subspecies of *Salmonella enterica*? Write down the basic steps followed for collection of boot swabs from floor housing system of poultry farm to investigate the presence of *Salmonella* serovars. How does *Chlamydochlamydia psittaci* replicate? 10
3. What are the samples you should collect for laboratory testing of highly pathogenic avian influenza subtype H5N1 and very virulent Newcastle disease virus? How can they be isolated from the samples collected? What are the set criteria based on which clades of different HPAI H5N1 viruses circulating in different parts of the world are defined? How can an isolate of a Newcastle disease virus from an area be named? 10
4. Give a brief outline on the etiology of duck viral hepatitis? Describe the laboratory diagnostic procedures that can be followed to confirm a duck plague outbreak? What are the serotypes and pathotypes of Marek's disease virus? Name the groups and subgroups of retroviruses associated with avian diseases. 10
5. How many segments are in the infectious bursal disease virus (IBDV) genome? Why many serotype and strains variations are seen in infectious bronchitis virus? Make a list of disease conditions that can be associated with *Escherichia coli* infection in poultry. How can you investigate the involvement of *E.coli*, infectious bronchitis virus and *Mycoplasma gallisepticum* in a reported outbreak of chronic respiratory disease (CRD) affecting chickens in a poultry farm? 10

**Chittagong Veterinary and Animal Sciences University**

**MS in Microbiology**

**July-December Semester 2018**

**Subject: Vaccinology**

**Corse Code: VCL-602**

**Total Marks: 40**

**Time: 2 hours**

(Figures in the right margin indicate full marks. Answer any four questions)

- 1 a) What is immunological memory? Graphically demonstrate the concept of immunological memory. 2+3  
b) Define vaccine. What are the ideal properties of a vaccine? 2+3
- 2 a) What is adjuvant? Classify adjuvant based on the mode of action. 2+5  
b) What are the characteristics of an ideal adjuvant? 3
- 3 Define following terms in relation to the principles of vaccine production. 2×5=10
  - a) Master seed
  - b) Safety test
  - c) Efficacy test
  - d) Inference test
  - e) Stability test
- 4 a) What is combined vaccine? Write down the advantages and disadvantages of combined vaccine. 2+4  
b) Write down the possible causes of vaccination failure. 4
- 5 Outline the principals, manufacturing process, and minimum requirements for the production of FMD Vaccine. 10

**Chittagong Veterinary and Animal Sciences University**

**MS in Microbiology Final Examination**

**July-December Semester, 2018**

**Course Title: Advanced Systemic Bacteriology**

**Course Code: ASB 602**

**Total Marks: 40      Time: 2 hours**

**Figures in the right margin indicate full marks. Answer any four questions.**

1. a) Enumerate the principal diseases and associated cell surface structures and secreted products involved in virulence of the streptococci of veterinary importance. 5
- b) What is MRSA and why is it a problem? Outline the laboratory diagnostic procedures and typing methods currently applied for the identification of *Staphylococcus aureus* and *Staphylococcus pseudintermedius*. 2+3
2. a) State the genus characteristics of *Corynebacterium*, *Haemophilus* and *Campylobacter*. Explain the mechanism of action of the tripartite toxins produced by *Bacillus anthracis*. 3+3
- b) What preliminary procedures are necessary in order to recover mycobacteria from clinical specimens? Give an overview of listeriosis in ruminants and possible route of introduction into food products for human consumption. 1+3
3. a) Make a list of leptospiral species containing pathogenic serovars. Summarize the important features of the neurotoxins of *Clostridium tetani* and *Clostridium botulinum*. 2+3
- b) Give an overview of current typing schemes used for *Salmonella*. 5
4. a) Explain different types of pathogenic *Escherichia coli* which produce extraintestinal disease in animals. 5
- b) Name the suitable specimens required from the various clinical conditions for the detection of *Listeria monocytogenes* and *Brucella abortus*? How can a case of leptospirosis in a dog be diagnosed in laboratory? 2+3
5. a) Why *Pseudomonas aeruginosa* is highly resistant to most antibiotics and disinfectants? Give comparative features of *Pseudomonas aeruginosa*, *Burkholderia mallei* and *Burkholderia pseudomallei*. 2+3
- b) List the environmental bacterial pathogens periodically isolated from cows with mastitis. Mention different molecular diagnostic and typing methods available to identify and characterize the isolates of *Pasteurella multocida*. Write down the factors that may predispose to infectious bovine keratoconjunctivitis. 2+2+1

Chittagong Veterinary and Animal Sciences University

MS in Microbiology

July- December, 2018

Subject: Advanced Immunology and Serology

Course code: AIS-602

Total marks: 40; Time: 2 hours

(Figures in the right margin indicate full marks. Answer any four questions)

- |   |   |                                                                                                                                                                           |    |
|---|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1 | a | Justify immunology course in Masters course of Microbiology                                                                                                               | 10 |
| 2 | a | Draw and label a typical IgG molecule with explanation of its components. Differentiate among different immunoglobulins in a tabular form                                 | 7  |
|   | b | Differentiate IgY and IgG.                                                                                                                                                | 3  |
| 3 | a | Explain biological features of complement and narrate their activation pathway process.                                                                                   | 10 |
| 4 | a | What is monoclonal antibody? Discuss its production process and list their implications in biological field.                                                              | 7  |
|   | b | Differentiate MHC class I molecule from MHC class II molecule.                                                                                                            | 3  |
| 5 | a | Draw and label interaction of ligand molecule and receptor between APC and CD4+ lymphocyte                                                                                | 3  |
|   | b | Justify role of B7, CD28, antigen processing time, extracellular antigen should be extracellular, MHC restriction, TAP gene for antigen presentation by APC to lymphocyte | 7  |