Chattogram Veterinary and Animal Sciences University
MS in Microbiology Final Examination
July-December Semester, 2023
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 pathogenic staphylococci of animals. Briefly describe the cell surface structures and secreted products of streptococci involved in virulence. 2+4
   b) Give an overview of clostridia involved in histotoxic infections in animals. 4

2. a) Make a list of Gram-positive pathogens along with the disease or disease conditions they cause in cattle, horse, pig and poultry. 4
   b) How can a case of listeriosis in a sheep be diagnosed in a laboratory? List the molecular techniques for the detection and strain typing of *Bacillus anthracis*. 4+2

3. a) List the main diseases caused by the major pathogenic *Actinobacillus* species in domestic animals. 3
   b) Name the cellular products produced by *Pasteurella multocida.* Write down the procedures for the isolation and identification of this pathogen from a case of haemorrhagic septicaemia in buffalo. How will you differentiate the pathogen from *Mannheimia haemolytica*? 2+4+1

4. a) Describe the antigenic properties of *Salmonella.* 5
   b) Give an overview of categories of *Escherichia coli* found in animals. 5

5. a) List Gram-negative non-spore-forming anaerobes which have been implicated in infections in domestic animals. Illustrate the transmission of *Leptospira* serovars. 2+4
   b) Briefly describe the virulence attributes of *Campylobacter jejuni*. 4

Chattogram Veterinary and Animal Sciences University
MS in Microbiology
July- December 2023
Subject: Advanced Immunology and Serology
Course code: AIS 602
Total marks: 40
Time: 2 hours
Answer any four (4) questions

1	a	Differentiate between MHC Class I and Class II molecule with neat diagram.	5.0
	b	Summarize Class I and Class II MHC pathway of antigen processing with diagram933	5.0
2	a	What is autoimmunity? Explain normal immune response to abnormal antigen and abnormal immune response to normal antigen	5.0
	b	What is hybridoma? Define monoclonal antibody. Explain mechanism of production of monoclonal antibody and its uses.	5.0
3	a	Draw and label receptors and correspond ligand molecules associated with presentation of antigen presenting cell to a CD4+ lymphocyte	5.0
	b	How will you proof that CD4+ co-receptor and MHC are essential for immune response during antigen presentation by APC with diagram	5.0
4	a	What is complement? Mention roles of complement in immune system	3.0
	b	Explain lectin and alternative pathway of complement activation	7.0
5	a	Explain basic structure of IgG molecule with a labelled neat diagram	4.0
	b	Differentiate among different classes of Ig in a tabular form	4.0
	c	Draw papain treated fragment IgG	2.0

Chattogram Veterinary and Animal Sciences University
Department of Microbiology and Veterinary Public Health
MS in Microbiology; July-December 2023
Subject: Advanced Systemic Virology; Course Code: ASV-602
Total Marks: 40; Time: 2 hours

(Figure of the right margin indicates full marks. Answer any four questions)

1	a)	Define emerging and reemerging viruses with examples. Mention the serotypes/genotypes of DENV and BVDV.	4
	b)	Enlist the viruses that affect the integumentarysystems of animals. How will you characterize the NDV in laboratory conditions for the preparation of an ideal vaccine candidate?	6
2	a)	Tabulate the host cell receptors and salient gross clinical signs, pathognomomic lesions, and complications produced by the following viruses: Bovine Ephemeral Fever Virus, Bluetongue Disease Virus, Zika Virus, Chikungunya Virus, Canine Parvovirus, Marex Disease Virus.	5
	b)	What types of clinical samples will you collect for the following viral diseases: Nipa virus, bovine herpes virus-1, BVDV, PRRSV, FIPV, and IBV?	3
	c)	Write down the roles of different structural components of the Rabies virus.	2
3	a)	Briefly describe the distinguishing characteristics of the Corona viridae, Paramyxo viridae, Flavi viridae, and Reoviridae families with the example of veterinary and zoonotic important viruses.	7
	b)	Enlist five cell culture media with a specific cytopathic effect commonly used for propagation of important veterinary viruses.	3
4	a)	Mention the specific viruses and possible mechanisms that were used to evade the host immune responses after infection.	4
	b)	Briefly describe the source and transmission mechanisms of different viruses.	4
	c)	How do mucosal diseases develop from BVDV?	2
5	a)	Enlist the different strains of SARS-CoV-2 and the lineage of the PPR virus.	3
	b)	Write down the short note of the following viruses;	3.5
		I. Pantropic viruses	×2
		II. Vector borne viruses	=7

Chattogram Veterinary and Animal Sciences University
MS in Microbiology Final Examination
July-December Semester 2023
Course Title: Vaccinology
Course Code: VCL 602
Total Marks: 40 Time: 2 hours

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

1. a) Briefly describe the ways by which viruses can be incorporated into vaccines. 6
   b) Explain the basic mechanisms by which adjuvants work. 4

2. a) Give an overview of the key quality control steps in the vaccine manufacturing process. 6
   b) Write down the possible ways by which vaccination failure may occur. 4

3. a) Describe the adverse consequences associated with the use of vaccines. 4
   b) Illustrate the basic processes required to produce a new vaccine through reverse vaccinology. 6

4. a) Enumerate the advantages and disadvantages of living and inactivated vaccines. Briefly discuss the ways by which bacteria may be rendered avirulent for use in vaccines. 7
   b) Explain the principle of DIVA. 3

5. a) How does nucleic acid vaccine work? 5
   b) Write down the factors that may influence the outcome of vaccination. 5

Chattogram Veterinary and Animal Sciences University

MS in Microbiology Final Examination; July – December Semester, 2023

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

Full Marks:40; Time: 2 hours

Answer any Four (4) Questions

1. Name the disease conditions caused by *Streptococcus* and *Enterococcus* species in birds. What is the basis of *Staphylococcus aureus* spa typing? Describe the procedure of sampling to determine *Salmonella* status of a poultry farm. 10

2. How can you diagnose infectious coryza in poultry? Based on which probable criteria avian pathogenic *Escherichia coli* strains are determined? How can you confirm a case of collibacillosis in laboratory? Name the major O serotypes of *E. coli* more frequently reported from poultry across the world. 10

3. What are the mechanisms by which *Mycoplasma gallisepticum* can evade immune system of the affected birds? How *Mycoplasma gallisepticum* infection status of a poultry flock can be assessed serologically? Briefly describe the morphological features of *Chlamydophila psittaci*. How the organism can be isolated and identified from a bird affected with it? 10

4. What are the proteins of infectious bronchitis virus? Name the serotypes of infectious bursal disease virus. Describe the aetiology of duck viral hepatitis. How the Anatid herpesvirus-1 can be isolated and identified from a field sample? 10

5. Below is the amino acid sequence of the HA segment of an avian influenza A virus strain isolated from Bangladesh:

FAIVSLVKSDQICIGYHANNSTEQVDTIMEKNVTVTHAQDILEKTHNGKLCDLDGVKPLILR
DCSVAGWLLGNPMCDEFLNVPEWSYIVEKINPANDLCYPGNFNDYEELKHLLSRINHFEKI
QIIPKSSWSDHEASSGVSSACPYQGRSSFFRNVVWLIKKNDAYPTIKISYNNTNQEDLLVLW
GIHHPNDAAEQTKLYQNPTTYISVGTSTLNLRLVPKIATRSKVNGQSGRMEFFWTILKPND
AINFESNGNFIAPENAYKIVKKGDSTIMKSELEYNCNTKCQTPVGAINSSMPFHNIHPLTIGE
CPKYVKSNRLVLATGLRNSPQGERRRKKRGLFGAIAGFIEGGWQGMVDGWYGYHHSNEQ
GSGYAADKESTQKAIDGVTNKVNSIIDKMNTQFEAVGREFNNLERRIENLNMEDGFLDVWT
YNAELLVLMENERTLDFHDSNVKNLYDKVRLQLRDNAKELGNGCFEFYHRCDNECMESV
RNGTYDYPQYSEESRLKREEISGVKLESIGIYQILSIYSTAASSLALAIMVAGLSLWMCSNGS
LQCRI

Based on the sequence information above, justify whether it is a highly pathogenic or a low pathogenic avian influenza virus. How Newcastle disease virus can be isolated from a field sample and how to verify whether or not the strain isolated is a virulent Newcastle disease virus? 10

Chattogram Veterinary and Animal Sciences University
Department of Microbiology and Veterinary Public Health
MS in Microbiology, July-December 2023
Subject: Molecular Microbiology; Course Code: MMB-602
Total Marks: 40; Time: 2 hours

(Figure of the right margin indicates full marks. Answer any four questions)

1	a)	Define nucleic acid hybridization. Tabulate different blotting techniques with their specific applications in molecular biology.	4
	b)	Define marker genes and ori?	1
	c)	Enlist different types of cloning vectors. Briefly describe the Bacteriophage vector with examples and application in molecular microbiology.	5
2	a)	Enlist restriction endonuclease enzymes with their recognition sites and types of ends generated during genomic modification.	5
	b)	What is microbiome. Differentiate between DNA sequencing and metagenomic sequencing.	3
	c)	Illustrate, how DNA ligase joins the two DNA fragments?	2
3	a)	What are junk DNA and ORF? Mention three ORF finder tools used in bioinformatics analysis.	3
	b)	Define microsatellites and STR. Sketch the process of metagenomic analysis sequentially.	4
	c)	List the different genotypic typing methods used in molecular microbiology.	3
4	a)	Explain the canonical bases in DNA sequencing.	1
	b)	Briefly describe the basic principles of DNA sequencing.	4
	c)	Define NGS and WGS. Enlist different advanced NGS technologies with their relative advantages and drawbacks.	5
5	a)	Mention the specific roles of regulatory genes, sigma factor, and repressor proteins in the operon system.	3
	c)	How will you quantify the nucleic acids after extraction?	2
	b)	Write down the following short notes:	2.5
		I. Column purification of nucleic acids	×
		II. Gene knockout	2=5