

MICROB-GE-5

MICROBES IN ANIMAL HEALTH

**Marks: 100 (Theory = 50 marks
Practicals = 50 marks)**

**Duration: Theory = 30 hours (2 credits)
Practicals = 60 hours(2 credits)**

Course objectives:

The main objective of this course is to introduce the students to the importance of microorganisms in animal health. Students will learn about the interactions of microbes with various types of livestock and pet animals. Students will be introduced to various bacterial, fungal, viral and protozoan diseases of animals. They will be introduced to various types of microorganisms residing in rumen, and learn about various methods for obtaining blood, rumen fluid and milk samples from animals. They will be introduced to principles of various diagnostic methods used in lab diagnosis of animal infections. Students will learn about the vaccination schedule followed for cattle and poultry.

Pre-requisite: Student should have studied Biology/ Biotechnology/ Biochemistry in 12th standard.

Course Learning Outcomes:

Upon successful completion of the course, the student:

CO1: Will be acquainted with various types of livestock and pet animals, rumen microflora, and their advantages and disadvantages.

CO2: Will have gained knowledge about the spectrum of diseases caused by bacteria and fungi in animals, becoming familiar with the symptoms, transmission mode, treatment, prevention and control of various bacterial and fungal diseases.

CO3: Will understand the symptoms, transmission, treatment, prevention and control of various diseases caused by viruses and protozoa.

CO4: Will be familiar with various methods of sampling of blood and rumen fluid. Will have had hands-on training for the detection of mastitis by testing milk samples.

CO5: Will be aware of the principles of serological tests based on agglutination, precipitation, haemagglutination inhibition, ELISA and lateral flow assays for diagnosis of animal diseases/infection.

CO6: Will have a fair understanding of vaccination schedule followed for cattle, buffalo and poultry. They will learn the concept of differentiation between the vaccinated and infected animals.

Contents:

Theory:

30 hours

Unit 1. Introduction to livestock and rumen microflora: A brief introduction of various types of livestock and pet animals: cattle, sheep, goat, dogs, cats and poultry. Different types of microbes in rumen along with their functions: archaeobacteria (methanogens), bacteria, protozoa, fungi (cellulolytic and proteolytic).

8

Unit 2. Bacterial and fungal diseases of animals: A concise overview of aetiological agent, symptoms, transmission, treatment, prevention and control of the following bacterial and fungal diseases: anthrax, brucellosis, mastitis, Johne's disease, campylobacteriosis, black quarter, haemorrhagic septicemia (HS), aspergillosis and mucormycosis. **12**

Unit 3. Viral and protozoan diseases of animals: An overview of aetiological agent, symptoms, transmission, treatment, prevention and control of following viral diseases: foot and mouth disease (FMD), rinderpest/PPR, blue tongue disease, avian influenza, canine distemper, rabies, babesiosis, theileriosis and trypanosomiasis. **10**

Practicals: **60 hours**

Unit 4. Sampling methods for obtaining blood, rumen fluid and milk: Sampling of blood from cattle, sheep, goat, dog, cat, mice and poultry by virtual lab. Sampling of rumen fluid: syringe, rumenotomy by virtual lab/video. Sampling of milk: California mastitis test. **15**

Unit 5. Serological tests for diagnosis of infectious agent: Principle and working method of: Agglutination, precipitation, haemagglutination inhibition assay, ELISA, and Lateral flow assay for antigen detection. **30**

Unit 6. Vaccination of livestock animals: Concept of differentiation between infected and vaccinated animal (DIVA test) for FMD and brucellosis. **Student group project:** Research study and review of the vaccination schedules for cattle, buffalo and poultry. **15**

Suggested Reading:

1. Brock Biology of Microorganisms by M.T. Madigan, K.S. Bender, D.H. Buckley, W.M. Sattley and D.A. Stahl. 16th edition. Pearson Education, USA. 2021.
2. Microbiology: A Laboratory Manual by J. Cappuccino and C.T. Welsh. 12th edition. Pearson Education, USA. 2020
3. Prescott's Microbiology by J. M. Willey, K. Sandman and D. Wood. 11th edition. McGrawHill Higher Education, USA. 2019.
4. Microbiology: An Introduction by G.J. Tortora, B.R. Funke, and C.L. Case. 13th edition. Pearson, USA. 2018.
5. Textbook of Microbiology by R. Ananthanarayan and C.K.J. Paniker. 10th edition. Universities Press, India. 2017.
6. Jawetz, Melnick and Adelberg's Medical Microbiology by K.C. Carroll, S.A. Morse, T.A. Mietzner and S. Miller. 27th edition. McGraw Hill Education. 2016.
7. Veterinary Microbiology by D. Scott McVey, Melissa Kennedy and M.M. Chengappa. 3rd edition. Wiley – Blackwell, USA. 2013.
8. Handbook of Good Dairy Husbandry Practices. National Dairy Development Board (NDDB).
9. Practical and Viva in Medical Microbiology by V. Randhawa, G. Mehta and K. Sharma. 2nd edition. Elsevier, India. 2009.

10. Mackie and McCartney Practical Medical Microbiology by J. Collee, A. Fraser, B. Marmion and A. Simmons. 14th edition. Elsevier publications. 1996

Facilitating the achievement of Course Learning Outcomes

Unit no.	Course Learning Outcomes	Teaching and learning Activity	Assessment Tasks
1.	Will be acquainted with various types of livestock and pet animals, rumen microflora, and their advantages and disadvantages.	Class room lectures on livestock, pet animals and rumen microflora. Pictures of various animal breeds.	Test and quiz on livestock, pet animals and rumen microflora.
2.	Will have gained knowledge about the spectrum of diseases caused by bacteria and fungi in animals, becoming familiar with the symptoms, transmission mode, treatment, prevention and control of various bacterial and fungal diseases.	Class room lectures on the aetiology, symptoms, transmission, treatment, prevention and control of bacterial and fungal diseases in animals. Pictorial representation of various signs and symptoms of diseases.	Test and quiz on symptoms, transmission and control of various diseases. Match the following type quizon disease and causative agent. Identification of disease based on photographs of specific disease presentation. MCQson causation of disease and prevention and control.
3.	Will understand the symptoms, transmission, treatment, prevention and control of various diseases caused by viruses and protozoa.	Class room lectures on the aetiology, symptoms, transmission, treatment, prevention and control of viral and protozoan diseases in animals. Pictorial representation of various signs and symptoms of diseases.	Test and quiz on symptoms, transmission and control of various diseases. Match the following type quizon disease and causative agent. Identification of disease based on photographs of specific disease presentation.

			MCQson causation of disease and prevention and control.
4.	Will be familiar with various methods of sampling of blood and rumen fluid. Will have had hands-on training for the detection of mastitis by testing milk samples.	Various sampling methods through virtual lab / videos. Performance of California test for diagnosing mastitis.	Quiz on various aspects of the practicals. Recording of principle, observations, result and precautions in practical records.
5.	Will be aware of the principles of serological tests based on agglutination, precipitation, haemagglutination inhibition, ELISA and lateral flow assays for diagnosis of animal diseases/infection.	Various diagnostic methods through virtual lab / videos. Performance of ELISA/lateral flow assay.	Quiz on various aspects of the practicals. Recording of principle, observations, result and precautions in practical records
.6.	Will have a fair understanding of vaccination schedule followed for cattle, buffalo and poultry. They will learn the concept of differentiation between the vaccinated and infected animals.	Student group research study and group discussion on vaccination for various diseases and concept of differentiation of infectious and vaccinated animals (DIVA).	Quiz on various vaccines and concept of DIVA.

* Assessment tasks are indicative and may vary.