# INSTITUTE OF PARA VETERINARY SCIENCES

Courses and Course Contents

of

Diploma in Veterinary Laboratory Technology (DVLT)

1<sup>st</sup> Semester

<table>
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<tr>
<th>Sr.No.</th>
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<th>Deptt.</th>
<th>Course Title</th>
<th>Cr.Hrs.</th>
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<tbody>
<tr>
<td>1</td>
<td>DVLT-I</td>
<td>VAN</td>
<td>Techniques in Anatomy</td>
<td>1+1</td>
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<tr>
<td>2</td>
<td>DVLT-II</td>
<td>VPTX</td>
<td>Management and Diagnostic sampling of Laboratory Animals</td>
<td>1+1</td>
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<tr>
<td>3</td>
<td>DVLT-III</td>
<td>VPB</td>
<td>Techniques in Biochemistry and Biotechnology</td>
<td>0+2</td>
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<td>4</td>
<td>DVLT-IV</td>
<td>VMI</td>
<td>Laboratory Management and Professional Ethics</td>
<td>1+1</td>
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<tr>
<td>5</td>
<td>DVLT-V</td>
<td>VPS</td>
<td>Techniques in Clinical Parasitology-I</td>
<td>1+1</td>
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<tr>
<td>6</td>
<td>DVLT-VI</td>
<td>VSR</td>
<td>Techniques in Surgery and Diagnostic Imaging-I</td>
<td>1+1</td>
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<tr>
<td>7</td>
<td>DVLT-VII</td>
<td>TVCC</td>
<td>Restraint and Handling of Domestic Animals and Diagnostic sampling</td>
<td>1+1</td>
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<tr>
<td>8</td>
<td>DVLT-VIII</td>
<td>VPHE</td>
<td>Occupational Hazards and Environmental Management</td>
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Total 7+9

2<sup>nd</sup> Semester

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<tr>
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<td>DVLT-IX</td>
<td>VAN</td>
<td>Techniques in Histology</td>
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<tr>
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<td>VPTX</td>
<td>Techniques in Pharmacology</td>
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<td>DVLT-XI</td>
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<td>4</td>
<td>DVLT-XII</td>
<td>VMI</td>
<td>Techniques in Clinical Microbiology-I</td>
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<tr>
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<td>VPS</td>
<td>Techniques in Clinical Parasitology-II</td>
<td>1+1</td>
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<tr>
<td>6</td>
<td>DVLT-XIV</td>
<td>VSR</td>
<td>Techniques in Surgery and Diagnostic Imaging-II</td>
<td>1+1</td>
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<tr>
<td>7</td>
<td>DVLT-XV</td>
<td>TVCC</td>
<td>Collection, Processing and Analysis of Clinical Samples</td>
<td>0+4</td>
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<td>8</td>
<td>DVLT-XVI</td>
<td>VPHE</td>
<td>Zoonosis, Public Health and Epidemiology</td>
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Total 5+12
### 3rd Semester

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<tr>
<td>1</td>
<td>DVLT-XVII</td>
<td>AN</td>
<td>Techniques in Feed Analysis</td>
<td>1+1</td>
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<td>2</td>
<td>DVLT-XVIII</td>
<td>AGB</td>
<td>Basic Information Technology</td>
<td>1+1</td>
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<tr>
<td>3</td>
<td>DVLT-XIX</td>
<td>VMI</td>
<td>Techniques in Clinical Microbiology-II</td>
<td>1+1</td>
</tr>
<tr>
<td>4</td>
<td>DVLT-XX</td>
<td>LPT</td>
<td>Dairy and Meat Technology</td>
<td>0+2</td>
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<tr>
<td>5</td>
<td>DVLT-XXI</td>
<td>VPP</td>
<td>Techniques in Clinical Pathology</td>
<td>1+1</td>
</tr>
<tr>
<td>6</td>
<td>DVLT-XXII</td>
<td>TVCC</td>
<td>Collection, Processing and Analysis of Clinical Samples</td>
<td>0+4</td>
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<td><strong>Total</strong></td>
<td><strong>4+10</strong></td>
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### 4th Semester

Practical/ Professional Training in **Diagnostic laboratories – 12 weeks**
DVLT-COURSE CONTENTS

DVLT-1  Techniques in Anatomy  1+1
(To be taught by Deptt. of VAN)

Theory
Introduction to gross anatomy of different organs of musculoskeletal, cardiovascular, respiratory, digestive, urinary, genital, endocrine and central nervous system of animals.

Practical
Demonstration of various organs of musculoskeletal, cardiovascular, respiratory, digestive, urinary, genital, endocrine and central nervous system of animals.

DVLT-II  Management and Diagnostic sampling of Laboratory Animals  1+1
(To be taught by Deptt. of VPTX)

Theory
Biology of different laboratory animals; feeding, watering and management of laboratory animals. Animal behavior, capture and restraint of laboratory animals. Collection of blood, urine, faeces and other body fluid samples in different laboratory animals. Anesthesia and Euthanasia of laboratory animals.

Practical
Capture and restraint of laboratory animals. Sexing, palpation, weaning, weighing and identification of laboratory animals. Collection of blood, urine, faeces and other body fluid samples in different laboratory animals. Sterilization and disinfection of laboratory animal house.

DVLT-III  Techniques in Biochemistry and Biotechnology  0+2
(To be taught by Deptt. of VPB)

Practical
Introduction to laboratory, glassware, plastic ware and instruments. Minimum requirements to start a laboratory. Hazards in clinical biochemical laboratory. Preparation and standardization of
acids and alkalies, concept of pH – preparation of buffer, colorimetric and electrometric determination of pH. Anti-coagulants and preservatives.

**DVLT-IV Laboratory Management and Professional Ethics**  
1+1  
(To be taught by Deptt. of VMI)

**Theory**
Laboratory equipments and gadgets. Laboratory practices, glass and plastic wares. Various signs and labels, and their uses. Disposal of clinical waste. Laws and ethics governing clinical laboratories.

**Practical**
Acquaintance of various laboratory equipments and apparatus. Good laboratory practices, cleaning, storage and maintenance of glass and plastic wares. Sterilization of laboratory materials. Labeling of various samples/containers. Preparation of sample date sheet, handling and preservation of various clinical samples. Safety cabinets, handling of hazardous materials.

**DVLT-V Techniques in Clinical Parasitology-1**  
1+1  
(To be taught by Deptt. of VPS)

**Theory**
Parasitology overview, Nematode parasites, Trematode parasites, Cestode parasites.

**Practical**
Collection and examination of faecal samples from animals: Direct smear examination, Floatation method, Sedimentation method, Sieving method, Quantitative fecal examination techniques for EPG like Stoll’s egg counting method, modified McMaster techniques, Borey and Pearson technique, Macroscopic examination of faecal material for worms, segments of worms, Amphistome, etc. Faecal culture method for nematode larvae collection and identification. Identification of important Nematode eggs like Ascaris suum, Toxacara spp., Parascaris,
Oxyuris, Ascaridia galli, Dictycaulus, Strongyle, Trichuris; Storngylloides, Spirocerca etc.
Identification of important Cestode eggs like: Moniezia spp., Dipylidium caninum, Taenia, Echinococcus, Hymenolepis spp. etc. Identification of important Trematode eggs like Fasciola, Amphistome, Dicrocoelium, Schistosoma indicum, Opisthorchis etc.
Collection and preservation of important Nematode, Trematodes and Cestodes of domestic species
Making permanent slides of Nematode, Trematodes and Cestodes affecting domestic animals.

**DVLT-VI  Techniques in Surgery and Diagnostic Imaging-1  1+1**

*(To be taught by Deptt. of VSR)*

**Theory**
Introduction, general surgical principles, suture materials used in veterinary practice.
Sterilization (asepsis-antisepsis, their application in veterinary surgery); disinfection; degeneration.
Definition of common terms in relation to anaesthesia. Injectable and inhalation anaesthetics. Preparation of the patient; and positioning. Local anaesthetics.

**Practical**

**DVLT-VII  Restraint and Handling of Domestic Animals and Diagnostic Sampling  1+1**

*(To be taught by Deptt. of TVCC)*

**Theory**
Indications for restraint, animal behavior, capture and restraint of horse, cattle, buffalo, camel, sheep, goat, pig, dog, cat and birds. Collection of blood, urine, faeces and other body fluid samples in different animal species.

**Practical**
Capture and restraint of horse, cattle, buffalo, camel, sheep, goat, pig, dog, cat and birds. Collection of blood, urine, faeces and other body fluid samples in different animal species.
DVLT-VIII  Occupational Hazards and Environmental Management  1+1

(To be taught by Deptt. of VPHE)

Theory

Practical
Occupational hazards in laboratories, general workplace hazards, medical and animal related hazards, objectives of safety programmes and safety measures.

DVLT-IX  Techniques in Histology  1+1

(To be taught by Deptt. of VAN)

Theory
Introduction to cell, tissue, epithelium and glands. Basic histological arrangement of tunics of different visceral organs. Different types of fixatives for histology.

Practical
Collection and preservation of anatomical specimens and biopsy material for paraffin technique of light microscopy. Different types of fixatives for histology. Section cutting of paraffin blocks. Preparation of routine and different special stains to demonstrate different histological structures. Staining of paraffin sections by H&E stain and other special stains. Frozen sectioning.

DVLT-X  Techniques in Pharmacology  0+1

(To be taught by Deptt. of VPT)

Practical
Introduction and classification of drugs and posions. Metrology, Pharmaceutical calculations and calculation of doses, route of drug administration, drug, and dosage forms. Safe storage of different class of drugs, pharmaceutical processes. Physicochemical properties of commonly used drugs, drug hazards and safety.
DVLT-XI  Techniques in Physiology  0+2

(To be taught by Deptt. of VPB)

Practical

DVLT-XII  Techniques in Clinical Microbiology -1  1+1

(To be taught by Deptt. of VMI)

Theory
Introduction to microbiology. Collection transport, storage/preservation and processing of samples for microbiological work. Specimen collection from living and dead animals for important microbial diseases of livestock and poultry. Isolation and identification of bacteria fungi and handling of bacterial and funagal cultures. Cell culture and embryonated egg inoculation for virus isolation and other virological work. Handling of virus cultures.

Practical
DVLT-XIII  Techniques in Clinical Parasitology-II  1+1

(To be taught by Deptt. of VPS)

Theory
Parasitology overview, Protozoan parasites, arthropod parasites.

Practical

DVLT-XIV  Techniques in Surgery and Diagnostic Imaging-II  1+1

(To be taught by Deptt. of VSR)

Theory
Introduction to diagnostic imaging, production of X-rays, X-ray equipments, exposure factors, image formation, radiographic film quality, radiation safety, contrast radiography, diagnostic ultrasonography, nuclear medicine, computed tomography, magnetic resonance imaging.

Practical
Acquaintance with X-ray machine, X-ray accessories and dark room equipments. Dark room processing techniques and X-ray film handling, computer aided image acquisition and retrieval, radiographic positioning of different regions in domestic and laboratory animals. Radiation safety measures, handling radioactive material. Familiarization with contrast radiographic techniques, fluoroscopic examination, ultrasonography, computed tomography, magnetic resonance imaging.
DVLT-XV  Collection Processing and Analysis of Clinical Samples  

(To be taught by Deptt. of TVCC)

Practical
Hands on practice for collection of blood, urine, faeces, tissues and other body fluid samples in different animal species. Preservation and dispatch of specimen for laboratory diagnosis. Hematological examination; biochemical examination of blood, plasma/serum, urine and other body fluids. Blood and faecal examination for parasites, microbiological examination of milk, meat, water, air etc. All preparations of aseptic surgery. Analysis of feed for toxic compounds etc.

DVLT-XVI  Zoonosis, Public Health and Epidemiology  

(To be taught by Deptt. of VPHE)

Theory
Epidemiological terms, representation of data, collection, preservation and dispatch of specimens for laboratory examination. Animal associated injuries, bacterial zoonosis, mycotic zoonosis, parasitic zoonosis, viral diseases. Importance of safe water, hygienic milk and meat products, bacteriological examination of milk, meat, air and sewage. Cleaning, sterilization and disinfection in food establishments.

Practical
Maintenance of epidemiological data, allergic tests for diagnosis of TB, JD. Analysis of poultry and cattle feed for aflatoxin and ochratoxin. Collection of water and food samples, bacteriological examination of water, air and sewage, inspection of meat.

DVLT-XVII-Techniques in Feed Analysis  

(To be taught by Deptt. of AN)

Theory
Different standard solutions used in nutritional evaluation. Different systems of feed evaluation, proximate system of analysis and its limitations. Sampling Procedures.

Practical
DVLT-XVIII-Basic Information Technology   1+1

(To be taught by Deptt. of AGB)

Theory
Introduction, evolution of computers, components of a computer, hardware vs software, system vs applications software, bits and bytes, input and output devices, RAM/ROM, secondary storage devices.
Microsoft windows, windows desktop, working with windows, exploring the control panel, common accessory, applications, windows explorer, ms office, internet and its applications like: email and browsing, various browsers like WWW (WORLD WIDE WEB) ; hyperlinks; http(HYPER TEXT TRANSFER PROTOCOL); ftp (FILE TRANSFER PROTOCOL) basics of networking—LAN, WAN

Practical
Various components of a computer and peripherals and their functions. Installation of windows, features of Windows as an operating system working with windows, windows explorer entering text and data, working with MS-Office.
Internet and its Application: Browsing and down loading of information from internet, sending and receiving e-mail. Preparation of media and reagents for various type of cell cultures. Setting-up of various types of cell cultures. Cryopreservation and recovery of cell cultures.
Isolation and titration of virus in cell cultures. Identification of viruses by serological and molecular tests such as PCR, electropherotyping.

DVLT-XIX  Techniques in Clinical Microbiology-II    1+1

(To be taught by Deptt. of VMI)

Theory
Introduction to immune system, immunity, antigen and antibody. Preparation of bio-reagents for immunological work. Serological immunological and molecular test for microbiological diseases. OIE prescribed tests for infectious disease. Methods of bacterial and viral vaccine production, formulation, and quality control testing of vaccines.

Practical
**DVLT-XX   Dairy and Meat Technology   0+2**

(To be taught by Deptt. of LPT)

**Practical**
Preservation and evaluation of meat and its products, preparation of meat and poultry products.
Candling, evaluation and preservation of shelled eggs and its products. Slaughtering techniques used for various types of birds. Slaughtering and evisceration of different kinds of birds.
Estimation of dressing percentage and yield. Grading of dressed chicken / poultry. Microbiological sampling of meat, poultry products and eggs.

**DVLT-XXI   Techniques in Clinical Pathology   1+1**

(To be taught by Deptt. of VPP)

**Theory**

**Practical**
Collection, labeling, transportation and preservation of different body fluids. Introduction to the techniques and methodology of the various haematological parameters (Hb, PCV, TEC, ESR, TLC and DLC). Demonstration of common staining of blood smear, its examination and interpretation of data. To acquaint methodology of urine analysis (Physical, chemical and microscopic examination). Demonstration of various equipments/ instruments/ materials required for post-mortem examination. Demonstration of technique of post-mortem examination of large and small animals including bovine, equine, swine, sheep, goat and canine. Demonstration of technique of post mortem examination of poultry. Study of post-mortem changes and lesions in various disease conditions.
Practice of writing post-mortem report. Collection, preservation and dispatch of specimen for laboratory diagnosis. Demonstration of technique of post-mortem examination of wild birds, wild animals and laboratory animals. Brief introduction of processing of tissues for histopathological examination: Grossing, paraffin wax embedding, blocking, cutting and staining.

**DVLT-XXII  Collection processing and analysis of clinical samples  0+4**

*(To be taught by Deptt. of TVCC)*

**Practical**
Hands on practice for collection of blood, urine, faeces, tissues and other body fluid samples in different animal species. Preservation and dispatch of specimen for laboratory diagnosis. Hematological examination; biochemical examination of blood, plasma/serum, urine and other body fluids. Blood and faecal examination for parasites, microbiological examination of milk, meat, water, air etc. All preparations of aseptic surgery. Analysis of feed for toxic compounds etc.

**DVLT  Practical/Professional Training**

*(Training to be imparted as per schedule)*

**Practical**
The students will undergo 12 weeks practical training in laboratory technology in different departments including Teaching Veterinary Clinical Complex on rotation basis to expose the students in different laboratory technologies. To build necessary understanding regarding use of various types of diagnostic equipments used in various laboratory technology. To develop practical skills pertaining to laboratory management and diagnostic skills in the various fields of clinical medicine and ensuring laboratory safety and quality assurance.

Dr.Diwakar Sharma                      Dr.Nirmal Sangwan                     Dr.D.K.Thukral
Member                                            Member                                        Member

Dr.R.A.Luthra                      Chairman