

# ***Course Curriculum and Syllabus***

***For the Degree of***

## **BACHELOR OF VETERINARY SCIENCE AND ANIMAL HUSBANDRY (B.V.Sc. & A.H.)**



# **SYLLABUS AND LECTURE OUTLINES OF COURSES**

## **DEPARTMENT OF VETERINARY ANATOMY**

### **SEMESTER I**

<b>Course Title</b>	:	<b>Veterinary Gross Anatomy –I (Osteology, Arthrology, and Biomechanics)</b>
<b>Course No.</b>	:	<b>VAN-111</b>
<b>Credit Hours</b>	:	<b>1+ 2 =3</b>

#### **I. SYLLABUS**

##### ***THEORY***

***Osteology*** : Definition of the terms used in Veterinary Anatomy in general and osteology in particular. Classification physical properties and structure of bones, Gross study of bones of appendicular and axial skeleton of Ox/Buffalo as type species and comparison with Sheep/Goat, Pig, Horse, Dog and Fowl with particular emphasis on their topography contours, landmarks, functional anatomy from clinical and production point of view. Detail study of bones of head, neck, thorax, abdomen, pelvis, tail, forelimb and hindlimb.

***Arthrology*** : Classification and structure of joints Articulation and ligaments of head, neck, thorax abdomen, pelvis, tail, forelimb and hind limb of ox/buffalo as type species, their structure functional anatomy and comparison with other domestic animal from clinical and production point of view.

***Biomechanics*** : Biomechanics and its application with reference to quadruped locomotion, kinetics of locomotion stress and strains falling on locomotor apparatus, landmarks, angulations and weight bearing bones of ox, buffalo and comparison with other animals particularly horse and dog.

##### ***PRACTICAL***

Comparative study of the bones of appendicular and axial skeleton, their structure, landmarks angulation, weight bearing and function in Ox/buffalo and comparison with sheep/goat, pig, horse dog and fowl and relate them in live animals. Dissection of joints of all the regions of Ox/Buffalo to study the structure and functional and comparison with other domestic animals. Biomechanics and kinetics of locomotion.

### **SEMESTER II**

<b>Course Title</b>	:	<b>Veterinary Gross Anatomy- II (Myology, Neurology, Angiology and Aesthesiology)</b>
<b>Course No</b>	:	<b>VAN-121</b>
<b>Credit Hours</b>	:	<b>2+2=4</b>

#### **I. SYLLABUS**

##### ***THEORY***

***Myology***: Structural and functional classification of muscles. Gross Study of skeletal muscles of head, neck, thorax abdomen, pelvis, tail, forelimb and hindlimb with their origin, insertion and action and their structural and functional importance from clinical and production point of view in Ox/Buffalo as a type species. Comparative study of muscles in other domestic animals.

***Neurology***: Study of central, peripheral and autonomic nervous system. Gross study of meninges, brain, spinal cord, cranial and spinal nerves and their functional importance from clinical and production point

of view. Gross morphology and disposition of the nerves of head, neck, thorax, abdomen, pelvis, tails, forelimb and hindlimb in Ox/ Buffalo as a type and comparative study in other domestic animals.

**Angiology:** Gross morphology of heat and disposition of arteries, veins and lymphatic of head, neck thorax, abdomen, pelvis, tail, forelimb and hindlimb in Ox/ Buffalo as type and comparison with that of Sheep/ Goat, Pig, Horse, Dog and Fowl. Their importance from clinical and production point of view Aesthesiology Gross morphological study of the eye, ear, nose, hoof, horn and skin in Ox/ Buffalo. Their functional importance and comparative study in other domestic animals. Computer simulation for dissection and study of body parts.

(**Note:** The general outline of muscular, circulatory and nervous system be taken up in The beginning of this course to be followed by gross disposition of group of muscles, arteries, veins and lymphatic simultaneously region-wise.)

### ***PRACTICAL***

Demonstration of embalming of the carcass and preservation. Dissection/Computer simulation models for dissection and demonstration of body parts.

Dissection of muscles of all body regions of Ox/ Buffalo, their location, functional role in the body and comparison with other species.

Study of brain and spinal cord in different domestic animals. Study of heart and major blood vessels in different species of animals. Area of auscultation of heart.

Dissection of blood vessels, lymphatics and nerves of head, neck thorax, abdomen, pelvis, tail forelimb and hindlimb in Ox/ Buffalo and comparative study in other domestic animals. Demonstration of palpable Lymph nodes of the body. Study of the sites of corneal, auriculo palpebral, peterson's, infraorbital, radial, ulnar, median, paravertebral epidural, pudendal, perineal and tibial nerve blocks and their clinical importance.

Dissection for study of eye, ear, nose, hoof and horn.

## **SEMESTER III**

<b>Course Title</b>	<b>:</b>	<b>Veterinary Histology and Embryology</b>
<b>Course No.</b>	<b>:</b>	<b>VAN-211</b>
<b>Credit Hours</b>	<b>:</b>	<b>2+2=4</b>

### ***I. SYLLABUS***

#### ***THEORY***

**General Histology:** Structure of animal cell and basic tissues and their functional activity– Epithelia and their modifications. Connective tissue and its components including blood and bones. Muscular tissue and its components. Nervous tissue, types and their functional peculiarities. Neuron, nerve fiber and ganglion. Systemic Histology: study of microscopic structure of the organs of digestive, respiratory, urinary, reproductive, nervous and cardiovascular system, sense organs, endocrines and lymphoid organs of domestic animals and birds.

**Embryology:** Gametogenesis, fertilization, cleavage, gastrulation, and the development of foetal membranes in birds and mammals. Structure and type of mammalian placenta. Development of the organs of digestive, respiratory, urogenital, cardiovascular, nervous and locomotor system and organs of special sense and endocrine glands. Fetal circulation.

## ***PRACTICAL***

Microscopy and micrometry, Comparison of light and electron microscopy. Histological techniques. Processing of tissues for paraffin sectioning and Haematoxylin and Eosin staining. Microscopic examination and identification of basic tissues and their components. Examination of histological sections of various organs/systems of domestic animals and birds. Study of structure of mammalian ova and spermatozoa and egg of fowl, Study of the whole mount and serial section of avian and mammalian embryo/foetus at different stages of development. Microscopic anatomy of fetal membranes and placenta of various domestic animals.

## **SEMESTER IV**

**Course Title** : **Veterinary Spanchnology And Applied Anatomy**  
**Course No.** : **VAN-221**  
**Credit Hours** : **1+1 = 2**

### ***I. SYLLABUS***

#### ***THEORY***

Gross morphological and topographical study of various organs of digestive, respiratory, urinary, male and female reproductive, lymphatic and endocrine systems. Pleura and Peritoneum in Ox Buffalo as type species and their comparison with that of Sheep/Goat, Pig, Horse, Dog, and Fowl.

Different Terminology used in applied Anatomy. Palpable Anatomical body structures and their use in Health and disease.

#### ***PRACTICAL***

Demonstration and description of palpable anatomical structures on the body surface of live animal (head, neck, thorax, pectoral bones, limbs). Outline of body cavities and study of organs of digestive, respiratory, urinary, reproductive, lymphatic and endocrine systems of Ox/ Buffalo and their comparative anatomy in sheep/goat, pig, horse, dog & fowl. Pleural and peritoneal reflections. Comparative topographic anatomy in live animals. Nerve blocks and their sites.

Applied anatomy of sites for thoraco-centesis, auscultation, abdominocentesis, rumenotomy, laparotomy, splenectomy, enterotomy, palpation of anatomical structures in the abdominal and perineal regions. Radiographic visualization of gross anatomical features of various regions of the body.  
(**Note:** Computer simulation model studies shall be used for better understanding of the subject.)

# DEPARTMENT OF VETERINARY PHYSIOLOGY AND BIOCHEMISTRY

## SEMESTER I

Course Title	:	Veterinary Physiology-I (Blood, Cardiovascular, Excretory System and Body Fluids)
Course No.	:	VPB -111
Credit Hours	:	2+1=3

### ***I. SYLLABUS***

#### ***THEORY***

Introduction to Blood; Properties of blood as a body fluid, metabolism and fate of R.B.C; Hemoglobin-chemical structure, synthesis, physiological functions, derivatives of hemoglobin;

Heart-morphological characteristic, systemic excitability conduction & transmission processes. Cardiac Cycle: - Regulation of cardiac output; coronary circulation; properties of pulse; metabolism & energetic of working myocardial cell, extrinsic and intrinsic regulation; ECG and its significance in Veterinary Sciences - Echocardiography.

Haemodynamics of circulation, circulation, circulatory mechanics, resistance to flow, vasoconstriction, nervous and circulating fluid volume controls of blood pressure, neurohormonal control of vascular smooth muscle. Circulatory controls- shock stresses, regional and fetal circulation. Capillary exchange, control of blood pressure.

Adjustment of circulation during exercise.

Kidney- Functional morphology of nephrons, factors determining filtration pressure, determination of glomerular filtration rate (GFR) and renal plasma flow - Reabsorption mechanisms for glucose, protein, amino acids, electrolytes; ammonium mechanism, glomerulo-tubular balance, methods of studying renal functions; urine concentration; micturition, uremia.

Fluid, water balance, fluid therapy, dehydration, water concentration mechanisms. Acid base balance and H<sup>+</sup> regulation, correction and evolution of imbalances, total osmotic pressure, potassium Formation and excretion of urine of Birds.

Cerebrospinal fluid, synovial fluids - composition, formation and flow; Joints. Regulation of bone metabolism and homeostasis.

#### ***PRACTICAL***

Collection of blood samples - Separation of serum and plasma - Preservation of de-fibrinated blood - enumeration of erythrocytes, leucocytes - differential leucocytic count - platelet count-estimation of hemoglobin-haematocrit-erythrocyte sedimentation rate-packed cell volume-coagulation time-bleeding time-Erythrocyte fragility and viscosity-blood grouping-recording of ECG-measurement of arterial blood pressure (Sphygmomanometry). Recording of cardiogram of frog heart-Study the effect of heat and cold on heart-effect of vagus stimuli on heat-vagal escape-factors affecting blood flow through blood vessels-urine analysis- physiological constituents, pathological determinates, determined of GFR. Titerable acidity, determination of inorganic phosphorus, urine ammonia and creatinine in urine.

## SEMESTER II

<b>Course Title</b>	:	<b>Veterinary Physiology-II ( Neuromuscular, Digestive &amp; Respiratory System)</b>
<b>Course No</b>	:	<b>VPB -121</b>
<b>Credit Hours</b>	:	<b>2+1=3</b>

### ***I. SYLLABUS***

#### ***THEORY***

Muscle Physiology- basic muscle unit characteristic-electrical phenomenon in muscle cell - Membrane potential ionic basis of resting membrane potential, muscle action potential, excitation and propagation of impulse characteristics- latent period refractive ness, threshold level-all & none characteristics - contractile mechanism - excitation - contraction coupling - neuro-muscular transmission, types of muscle contraction, phenomenon of fatigue, rigor mortis.

Organization of nervous system- Mechanism of information processing, hierarchical control. Major function system- sensory, consciousness, emotion, motor and visceral control and basic functional unit - neuron structure, type- functional characteristics of sub-units of neuron. Membrane potential - ionic basis of resting membrane potential (RMP) nerve action potential, excitation and propagation of impulse characteristics- latent period- refractive ness, threshold level-all & none characteristics. Degeneration and regeneration of nerve fibre. Synaptic and junctional transmission.

Functions of nervous system-reflexes-control of posture and movements, autonomic nervous system and visceral control. Neurotransmitter wakefulness, sleep cycle. Higher function of neurons system - learning, memory. Familiarization with common equipments used in neurophysiology (oscilloscope, electroencephalography, machine stimulators etc).

Sense organs and receptors physiology of special senses - Eye: functional morphology, nourishment and protection neural pathway, receptors- optics, ocular muscles and movements, photochemistry, eye defects and eye examinations (as an aid to clinical evaluation). Ear: Physiology of hearing and common hearing impairment. Vestibule apparatus. Physiology of olfaction and taste.

Morphological characteristic of monogastric and poly gastric digestive system. Prehension, rumination; defecation; vomition; regulation of secretory function of saliva, stomach, intestine, pancreas; bile secretion; hunger, appetite control, developmental aspects of digestion; luminous, membranous and microbial digestion in rumen and intestine; permeability characteristics of intestine, forces governing absorption, control intestinal transport of electrolyte and water, enzymatic digestion in monogastric and fermentative digestion in rumen, modification of toxic substances in rumen. Digestion in birds.

Functional morphology of respiratory apparatus. Mechanics of breathing. Transport of blood gases, foetal and neonatal oxygen transport, dissociation curves, pressures, recoil tendency, elasticity, surfactants, pleural liquid, compliance, exchanges of gases in lungs and tissues, neural and chemical regulation of breathing, diffusion, perfusion, hypoxia. Frictional resistance to air flow, airways smooth muscle contraction, respiratory muscle work, panting, adaptation of respiration during muscles exercise high altitude hypoxia, Non-respiratory lung functions. Respiration in birds.

#### ***PRACTICAL***

Counting of rumen motility, estimation of volatile fatty acids and ammonia in rumen. Bacterial and protozoal count. *In-vitro* action of proteolytic enzymes- pepsin and trypsin. Experimental physiology: Pithing of frog, preparation of nerve muscle-Recording of twitch response, effect of single stimulus- effect of heat and cold. Fatigue - summation, tetanus. Recording of respiration, spirometry. Recording of volume and capacities in different physiological states including determination of vital capacities. Recording of rumen/intestinal movements (Demonstration).

## SEMESTER IV

<b>Course Title</b>	:	<b>Veterinary Physiology – III (Endocrinology, Reproduction, Growth and Environmental Physiology)</b>
<b>Course No</b>	:	<b>VPB -221</b>
<b>Credit Hours</b>	:	<b>3+1=4</b>

### ***I. SYLLABUS***

#### ***THEORY***

Hormone cell interaction, sub-cellular mechanisms-metabolism of hormones-methods of study of endocrine system; Receptors- mechanism of regulation; Chemistry of hypothalamo- hypophyseal hormones, target organ, pineal, thyroid, thymus, pancreas, adrenal, prostaglandins, hormones of calcium metabolism, disorders, rennin-angiotensin system, atrial natriuretic factors, erythropoietin, GI hormones, pheromones.

Genetic & endocrine control of gonadal development, modification of gonadotrophin release, ovarian functions, follicular development, dynamics, endocrine and receptor profiles, sexual receptivity, ovarian cycle, post partum ovarian activity, ovum transport, capacitation, fertilization, reproductive cycles in farm animals- hormones present in the biological fluids during pregnancy and their uses for the diagnosis of pregnancy- maternal foetal placental participation in pregnancy & parturition, immunology of gestation, preparturient endocrine

Spermatogenic cycle and wave- function of sertoli cell-leydig cell-semen - composition- evaluation; Testosterone - function and regulation - cryptorchidism. Puberty - photoperiod-uses of androgens, progestogens, estrogens.

Functional and metabolic organization of mammary glands - structure and development; effect of estrogens and progesterone; hormonal control of mammary growth; lactogenesis and galctogenesis; biosynthesis of milk constituents- secretion of milk, mastitis and metabolism, prolactin and mammary tumours-lactation cycle.

Biochemical and genetic determinants of growth, regulation of growth, metabolic and hormone interactions, factors affecting efficiency of growth and production in ruminants and single stomach animals. Growth in meat producing animals & birds, growth curves. Recombinant gene transfer technologies for growth manipulation- advantages and limitations. Protein deposition in animals and poultry.

Heat balance, heat tolerance, hypothermia, hyperthermia, thermo-regulation in farm animals, role of skin, responses of animals to heat and cold, fever, body temperature and hibernation. Temperature regulation in birds.

Climatology- various parameters and their importance. Effect of different environmental variables like temperature, humidity, light, radiation, altitude on animal performance. Acclimation, acclimatization - general adaptive syndrome. Clinical effect on endocrine - reproductive function, circadian rhythm.

Neurophysiology of behaviors, types of behaviour, communication, Learning and memory behavioural plasticity.

#### ***PRACTICAL***

Oestrus and phases of oestrous cycle in animals (vaginal mucus). Behavioural signes of oestrus. Bio assay for trophic hormone. Demonstration of hormone estimation. Rectal palpation of reproductive organs. Sperm motility, sperm concentration -live and dead - abnormal sperm count. Measurement of growth in various species. Measuring surface area of animals. Health parameters of animals- body temperature, pulse, respiration and heart rate. Measurement of animal environmental conditions. Behaviour of animals- mating behavior, feeding behaviour (live/videographic/computer simulated demonstration).

## SEMESTER I

<b>Course Title</b>	:	<b>General Veterinary Biochemistry</b>
<b>Course No.</b>	:	<b>VPB-112</b>
<b>Credit Hours</b>	:	<b>1+1= 2</b>

### ***I. SYLLABUS***

#### ***THEORY***

Scope and importance of biochemistry. Structure of biological membranes and transport across membranes. Donnan membrane equilibrium. Dissociation of acids, pH, buffer systems, Henderson-Hasselbalch equation.

Biochemistry of carbohydrates. Biological significance of important Monosaccharides (ribose, glucose, fructose, galactose, mannose and amino sugars), Disaccharides (maltose, isomaltose, lactose, sucrose & cellobiose), Polysaccharides, (starch, dextrans, glycogen, cellulose, inulin, chitin), and Mucopolysaccharides including bacterial cell wall polysaccharides.

Biochemistry of lipids: Properties and biological significance of simple, compound and derived lipids and lipoproteins. Structure and functions of prostaglandins. Chemistry of bile and bile acids.

Biochemistry of proteins: Structure, properties and biological significance of proteins. Amino acids: classification and structure of neutral, basic and acidic amino acids. Properties of amino acids: amphoteric nature, optical activity, and peptide bond formation. Chemical reactions of proteins.

Biochemistry of nucleic acids: Chemistry of purines, pyrimidines, nucleosides and nucleotides. Biological significance of nucleosides & nucleotides. Structures and functions of deoxyribonucleic acid (DNA) and a typical ribonucleic acid (RNA).

#### ***PRACTICAL***

Concentration of solutions – System International (S.I.) Units. Preparation/ standardization of acids & alkalies. Preparation of buffers and determination of pH. Titration curve of acid versus base. Reactions of mono-, di-, and polysaccharides and their identification. Estimation of lactose in milk. Determination of acid number of an oil. Colour reactions of proteins. Precipitation reactions of proteins. Estimation of amino acids (Sorensen's method)

## SEMESTER II

<b>Course Title</b>	:	<b>Veterinary Intermediary Metabolism</b>
<b>Course No.</b>	:	<b>VPB-122</b>
<b>Credit Hours</b>	:	<b>2+1= 3</b>

### ***I. SYLLABUS***

#### ***THEORY***

Enzymes: Definition and classification, EC numbering of enzymes. Coenzymes, cofactors & iso-enzymes.

Properties: Protein nature, enzyme-substrate complex formation, modern concept of the active center of enzyme. Specificity of enzyme action: Substrate specificity, group specificity, stereo or optical specificity.

Factors influencing enzyme action: Effects of temperature, pH, concentration of substrate and enzyme.

Enzyme units: International Units, Katal, turnover number & Specific activity.

Enzyme inhibition: Competitive, non-competitive, uncompetitive inhibition & suicidal inhibition. Allosteric enzymes.



Biological oxidation: Enzymes and coenzymes involved in oxidation and reduction viz. Oxidoreductases, oxidases, oxygenases, dehydrogenases, hydroperoxidases & cytochromes.

Respiratory chain/electron transport chain, oxidative phosphorylation, inhibitors, uncouplers and other factors influencing electron transport chain.

Carbohydrate metabolism: Glycolysis, Krebs's cycle, glyoxylate cycle, HMP shunt, gluconeogenesis, Cori cycle, glycogenesis, glycogenolysis, hormonal control of carbohydrate metabolism & regulation of blood sugar. Bioenergetics of carbohydrate metabolism.

Lipid metabolism: Beta oxidation of fatty acids, ketone body formation, biosyntheses of fatty acids, triacylglycerol, phospholipids & lipoprotein metabolism. Bioenergetics of lipid metabolism.

Protein metabolism: Biosynthesis and degradation. Deamination, transamination and decarboxylation of amino acids. Ammonia transport and urea cycle

Nucleic acids: Metabolism of purines and pyrimidines. DNA & RNA biosynthesis.

Integration of metabolism. Metabolic functions of macro and micro nutrients, metabolic functions of lipid and water soluble vitamins. Uses of isotopes in metabolic studies.

### **PRACTICAL**

Effect of pH and temperature on enzyme activity. Estimation of normal/abnormal constituents of urine. Electrophoretic separation of proteins. Paper chromatography. Estimation of bilirubin, blood glucose, electrolytes and other metabolic intermediaries in blood (colorimetry/spectrophotometry/flame photometry).

## **SEMESTER IV**

**Course Title** : **Animal Biotechnology**

**Course No.** : **VPB-321**

**Credit Hours** : **2+1=3**

### **I. SYLLABUS**

#### **THEORY**

Definitions, basic concepts and scope of animal biotechnology. Recombinant DNA technology. Gene cloning, vectors and expression vectors. Transformation and transfection. Polymerised chain reaction (PCR), construction of genomic library and cDNA library. DNA sequencing. Principles of transfer of nucleic acids and proteins (Southern, Northern and Western blotting), Nucleic acid hybridization, DNA probes and DNA fingerprinting.

Biotechnological application in animal improvements:

Embryo biotechniques, *in-vivo* and *in-vitro* embryo production and preservation, sexing, micromanipulation and cloning, transgenic animal and biopharming.

Mapping of genome and genome sequencing. Marker assisted selection. Gene banking.

Nutritional biotechnology including bioconversion of lignocellulose, genetic manipulation of microbes for improved feed utilization and health. Animal tissue culture, transformation and cell lines, tumor markers and acute phase proteins

Molecular diagnosis including PCR and DNA probes. Hybridoma and monoclonal antibodies. New generation vaccines: Subunit recombinant and recombinant vectored vaccines

Fermentation process and technologies for milk, meat and leather. Ethics and regulatory issues in Biotechnology. IPR. Bioinformatics.

***PRACTICAL***

DNA and plasmid isolation. Gel electrophoresis. PCR. Screening of gametes and embryo. Use of Multimedia and audio-visual aids for molecular biology aspects.

**(The course is to be taught jointly with the Departments of Veterinary Microbiology and Veterinary Gynaecology and Obstetrics)**

# DEPARTMENT OF VETERINARY PHARMACOLOGY AND TOXICOLOGY

## SEMESTER V

### Veterinary Pharmacology Paper-I

Course Title	:	General and Systemic Veterinary Pharmacology
Course No.	:	VPT-311
Credit Hours	:	2+1=3

### ***I. SYLLABUS***

#### ***THEORY***

Historical development, branches and scope of Pharmacology. Sources and nature of drugs. Pharmacological terms and definitions. Principles of drug activity: Pharmacokinetics – Routes of drug administration, absorption, distribution, biotransformation and excretion of drugs. Pharmacodynamics- Concept of drug and receptor, dose-response relationship, terms related to drug activity and factors modifying the drug effect and dosage. Fundamentals of drug-screening and assay of drug. Adverse drug reaction, drug interaction, drug designing and development, bio prospecting of drugs. Introduction to biopharmaceutics and gene therapy.

Drugs acting on digestive system: Stomachics, antacids and antiulcers, prokinetics, carminatives, antizymotics, emetics, antiemetics, purgatives, antidiarrhoeals, cholerectiics and cholagogues, Rumen pharmacology.

Drugs acting on cardiovascular system: cardiac glycosides, antiarrhythmic drugs, vasodilators and antihypertensive agents, haematinics, coagulants and anticoagulants.

Drugs acting on respiratory system: Expectorants and antitussives, respiratory stimulants, bronchodilators and mucolytics.

Drugs acting on urogenital system: Diuretics, urinary alkalizers, and acidifiers, fluid therapy, ecbolics and tocolytics.

Pharmacotherapeutics of hormones and vitamins.

Drugs acting on skin and mucous membranes: Emollients, demulcents and counter irritants.

Bio-enhancers, Immunostimulants and immunosuppressant.

New drugs and drug formulations.

#### ***PRACTICAL***

Pharmacy appliances, Principles of compounding and dispensing.

Metrology: systems of weight and measures, pharmacy calculations. Pharmaceutical processes. Pharmaceutical dosage forms. Prescription writing, incompatibilities. Drug standards and regulations, Custody of poisons. Compounding and dispensing of powders, ointments, mixtures, liniments, lotions, liquors, tinctures, emulsions, and electuaries.

## SEMESTER VI

Course Title	:	Veterinary Neuropharmacology
Course No.	:	VPT-321
Credit Hours	:	2+1=3

### I. SYLLABUS

#### THEORY

Drugs acting on autonomic nervous system: Neurohumoral transmission, adrenoceptor agonists and antagonists, adrenergic neuron blockers, cholinceptors agonists and antagonists, ganglionic stimulants and blockers.

Autacoids: Histamine and antihistaminic agents, 5-Hydroxytryptamine and its antagonists, prostaglandins, angiotensin and bradykinin.

Drugs acting on central nervous system (CNS): Pharmacology of neurotransmitters. History of general anaesthetics and theories of anaesthesia. Inhalent, intravenous and dissociative anaesthetics; hypnotics and sedatives; tranquilizers, psychotropic drugs, anticonvulsants, opioid analgesic, non-steroidal anti-inflammatory drugs, analeptics and other CNS stimulants, central muscle relaxants.

Drugs acting on somatic nervous system: Local anaesthetics and peripheral muscle relaxants.  
New drugs and drug formulations.

#### PRACTICAL

Demonstration of the effect of CNS depressants, analgesics, CNS stimulants, muscle relaxant, anticonvulsants, local anaesthetics in laboratory animals.

Demonstration of the action of adrenergic and cholinergic agonists and antagonists on isolated and intact preparations of the animals.

Alternate use of animals as model for demonstration

## SEMESTER VII

Course Title	:	Veterinary Chemotherapy
Course No.	:	VPT-411
Credit Hours	:	2+0=2

### I. SYLLABUS

#### THEORY

Antibacterial agents: Classification, general principles in antibacterial chemotherapy, antibacterial resistance. Sulphonamides and their combination with diaminopyrimidines, sulfones, nitro furans, nalidixic acid and fluoroquinolones.

Antibiotics: Penicillins and cephalosporins, aminoglycosides, tetracyclines, chloramphenicol, macrolides, polypeptides. Miscellaneous agents: methenamine, bacitracin. Rifampin, novobiocin, virginiamycin, lincosamides and vancomycin.

Antifungal agents: Topical and systemic agents including anti-fungal antibiotics.

Anthelmintics: Drugs used against cestodes, trematodes, nematodes, drug resistance, broad-spectrum anthelmintics.

Antiprotozoal agents: Drugs used in trypanosomosis, theileriosis, babesiosis, coccidiosis, amoebiosis, giardiosis and trichomoniasis.

Ectoparasiticides, Antiviral and anticancer agents, Antiseptics and disinfectants, Growth promoters.

Common indigenous drugs of plant origin with proven pharmacological and therapeutic efficacies in various animal ailments.

New drugs and drug formulations.

## SEMESTER VIII

**Course Title** : **Veterinary Toxicology**  
**Course No.** : **VPT-421**  
**Credit Hours** : **2+0=2**

### ***I. SYLLABUS***

#### ***THEORY***

General Toxicology: Definitions, fundamentals and scope of toxicology. Sources and mode of action of poisons. Factors modifying toxicity. General approaches to diagnosis and treatment of poisoning.

Toxicity caused by metal and non-metals: Arsenic, lead, mercury, copper, selenium, molybdenum, phosphorus, nitrates and nitrites, common salt and fluoride.

Toxicity caused by plants and weeds: Cyanogenetic plants, abrus, lantana, ipomoea, nerium, datura, nuxvomica, castor, selenium containing plants oxalate producing plants, plants causing thiamine deficiency.

Drug toxicity and toxicity caused by agrochemicals: organophosphates, carbamates, chlorinated hydrocarbons, pyrethroids, herbicides, fungicides, rodenticides and urea.

Residue toxicology: Hazards of residues, concepts of withdrawal time and MRLs, minimizing drug and toxic residues in animal products.

Venomous bites and sting: Snake bite, scorpion, spider, wasp stings and toad poisoning. Radiation hazards and industrial toxicants. Toxicity caused by food additives and preservatives.

# DEPARTMENT OF VETERINARY PARASITOLOGY

## SEMESTER III

Course Title	:	General Veterinary Parasitology And Helminthology
Course No.	:	VPA-211
Credit Hours	:	3+1=4

### I. SYLLABUS

#### ***THEORY***

Parasites and parasitism. Types of Parasitism. Commensalism, symbiosis predatorism. Types of hosts: Final and intermediate hosts, paratenic host and reservoir hosts, natural and unnatural hosts. Host parasite relationships; modes of transmission of parasites and methods of dissemination of the infective stages of the parasite. Parasite specificity in relation to species, breed, sex and location. Tissue reactions caused by parasites to the host. Resistance of hosts to parasitic infections/infestation. Immunity against parasitic infections. Standardized Nomenclature of Animal Parasitic Diseases (SNOAPAD). General description of helminth parasites affecting domestic animals and birds.

Classification of helminths. Characteristics of phylum (Platyhelminthes, Nematelminthes and Acanthocephala). Salient morphological features of diagnostic importance. Life cycle of the helminths in relation to transmission, pathogenesis, epidemiology, diagnosis, general control measures of following helminths of animals and birds.

#### ***TREMATODES***

Liver flukes (*Fasciola*, *Dicrocoelium* and *Opithorchis*), intestinal flukes (*Fasciolopsis*), blood flukes (nasal schistosomosis), cercarial dermatitis (*Schistosoma* and *Ornithobilharzia*), visceral schistosomosis (*S. spindale*, *S. indica*, *S. incognitum*), Amphistomes/immature amphistomosis (*Paramphistomum*, *Cotylophoron*, *Gastrothylax*, *Gastrodiscus*, *Gigantocotyle*, *Gastrodiscoides*, *Pseudodiscus*), Lung flukes (*Paragonimus*) and oviduct flukes (*Prosthogonimus*) their importance in the diagnosis.

#### ***CESTODES***

Metacestodes (bladder worm), Ruminant tape worms (*Moniezia*, *Avitellina*, *Stilesia*), Dog tape worms (*Dipylidium*, *Taenia*, *Multiceps* and *Echinococcus*), Equine tape worms (*Anoplocephala*, *Paranoplocephala*), Poultry tape worms (*Davainea*, *Cotugnia*, *Raillietina*, *Amoebotaenia*) and Broad fish tape worms (*Diphyllobothrium*), Dwarf tape worm (*Hymenolepis*).

#### ***NEMATODES***

*Ascaris*, *Parascaris*, *Toxocara*, *Toxascaris*, *Ascaridia*, *Heterakis* and *Oxyuris*. Bursate Worms (*Strongyloides*, *Strongylus*, *Chabertia*, *Syngamus*, *Oesophagostomum*), Kidney worms (*Stephanurus*, *Dioctophyma*), Hook worms (*Ancylostoma*, *Agriostomum*, *Bunostomum*), *Trichostrongylus*, *Ostertagia*, *Cooperia*, *Nematodirus*. Stomach worms (*Haemonchus* *Mecistocirrus*). Tissue roundworms (*Habronema*, *Thelazia*, *Spirocerca*, *Gongylonema*). Filarial worm, (*Dirofilaria Parafilaria*, *Onchocerca*, *Setaria*, *Stephanofilaria*). Lung worms (*Dictyocaulus*, *Mullerius* and *Protostrongylus*). Guinea worms (*Dracunculus*). International regulations for control of different helminthic diseases.

#### ***PRACTICAL***

Methods of collection, fixation, preservation and mounting of helminth parasites. Study of morphological characters of adults and their larval stages and damages caused by them. Identification of important trematodes, cestodes and nematodes. Examination of faecal samples for eggs of trematode, cestode and nematode. Demonstration of the life cycle and development of the type species of Trematode, Cestode and Nematode.

## SEMESTER IV

**Course Title :** Veterinary Entomology And Acarology  
**Course No. :** VPA-221  
**Credit House :** 1+1=2

### I. SYLLABUS

#### THEORY

General description of insecta and arachnida affecting domestic animals and birds. Arthropoda as direct/indirect parasites. Classification. Life Cycle and vector potentiality in relation to disease transmission, pathogenesis and control of following arthropods affecting animals and birds.

The biting midges (*Culicoides*), buffalo/Black fly, gnats (*Simulium*), sandflies (*Phlebotamus*). The mosquitoes (*Culex*, *Anopheles* and *Aedes*). Horse fly (*Tabanus*), *Musca*, *Stomoxys*, *Sarcophaga*, Warbles (*Hypoderma*) and bots (*Gasterophilus*), Nasal bot (*Oestrus ovis*), Myiasis, Wingless flies (*Hippobosca*, *Melophagus*), bugs, lice (*Haematopinus*, *Linognathus*, *Trichodectus*, *Damalina*, *Menopon*, *Lipeuris*, *Menacanthus* (Poultry lice). Fleas (*Pulex*, *Ctenocephalides*, *Echidnophaga*, *Xenopsylla*). Arachnids (Ticks and mites of Veterinary importance. Soft tick (*Argasidae*), (*Argus*, *Orthinodorus* and *Otobius*).

Hard ticks (*Boophilus*, *Hyalomma*, *Rhipicephalus*, *Haemophysalis*, *Amblyomma*, *Ixodes*), Mites (*Demodex*, *Sarcoptes*, *Psoroptes*, *Notoedres*, *Chorioptes*). Anti-tick immunoprophylaxis. Damages to hide and skins due to ectoparasitic infestation.

#### PRACTICAL

Demonstration of the type representatives of various groups of insects, ticks and mites through charts, specimen and mounted slides. Demonstration of different characters of Insecta and Arachnida (Tick and mites). Procedure for diagnosis of arthropod infestation to hides and skin. Demonstration of enteric myiasis, Procedures for the collection, fixation, preservation and mounting of arthropods parasites.

## SEMESTER IV

**Course Title :** Veterinary Protozoology  
**Course No. :** VPA-222  
**Credit House :** 2+1=3

### I. SYLLABUS

#### THEORY

Introduction and general description to protozoa and their development. Differentiation from protophyta, bacteria and rickettsia, Classification. Life cycle in relation to transmission pathogenesis, diagnosis and control of protozoa of Veterinary importance. Kalazar (visceral and Cutaneous leishmaniasis, Animal Trypanosomosis (Surra), Trypanosomosis (due to African Trypanosoma) in cattle and man.

Bovine and avian trichomonosis, black head in turkeys (*Histomonas*), Bovine amoebae (*Entamoeba* and *Balantidium*), *Giardia* sp. Coccidia and coccidiosis of poultry and animals. Cryptosporidiosis, Cyst forming coccidian (*Toxoplasma*, *Sarcocystis*), *Neospora* (*Neospora caninum*), Malaria parasite of animals and poultry (*Plasmodium* and *Haemoproteus*), Piroplasmosis (*Babesia*), Theilerosis (*Theileria*).

Recent developments in protozoan vaccines for field use. International regulations for control of different protozoan diseases.

#### PRACTICAL

Examination of faecal materials for identification of intestinal protozoa, coccidian and flagellates. Preparation of blood smears, their staining and examination of slides for haemoprotozoan parasites. Methods of collection, fixation, preservation and mounting of protozoan parasites. Identification of representative slides of protozoan parasites.

# DEPARTMENT OF MICROBIOLOGY

## SEMESTER III

**Course Title** : General Veterinary Microbiology  
**Course No.** : VMC-211  
**Credit Hours** : 1+1=2

### ***I. SYLLABUS***

#### ***THEORY***

Introduction and history of Microbiology, Structure, growth and nutrition of bacteria. Classification and nomenclature of bacteria. Sources and transmission of infection. Pathogenicity, virulence and infection. Resistance and susceptibility of host, bacteraemia, septicaemia, toxemia, endotoxins and exotoxins; Bacterial genetics. Plasmids, Antibiotic resistance. Introduction, morphology, growth, nutrition, reproduction in fungi, Classification of fungi. Introduction to viruses: General properties, Replication, Cultivation and Purification of viruses. Cell-Virus interactions. Viral genetics. Interferon.

#### ***PRACTICAL***

Equipment, Sterilization, disinfection and asepsis, Staining (simple & Grams, acid fast, lactophenol cotton blue), Special staining (metachromatic granules, capsular, spore). Bacterial motility, preparation of culture media. Aerobic and anaerobic cultivation, Isolation of bacteria in pure culture, Morphological and cultural characteristics, biochemical characters, Antibiogram, Phenol coefficient test, Slide culture technique for fungus.

## SEMESTER IV

**Course Title** : Veterinary Immunology And Serology  
**Course No.** : VMC-221  
**Credit Hours** : 1+1=2

### ***I. SYLLABUS***

#### ***THEORY***

Concepts in Veterinary and medical Immunology. Immune system: organs, tissues and cells. Types of immunity. Development of humoral and cellular immune responses. Antigens: definition, specificity, types and factors affecting immunogenicity, blood group antigens. Antibodies: Structure, properties and function of different classes of immunoglobulins, Site, mechanism and theories of antibody production, Monoclonal antibodies. Major histocompatibility complex, Complement system; cytokines: Major types and functions. Serological reactions: Agglutination, precipitation, haemagglutination; Phagocytosis, opsonic index, cytolysis; Complement fixation, neutralization, toxin and antitoxin reaction, immunofluorescence; Hypersensitivity: classification and mechanism of induction. Autoimmunity and immunotolerance. Immunization of animals. Biologicals: Role of conventional and modern vaccines in immunoprophylaxis. Adjuvants. Quality control of biologicals.

#### ***PRACTICAL***

Preparation of antigen, Raising of antisera, Concentration of immunoglobulins, Agglutination (plate, tube), Precipitation {Agar gel precipitation test (AGPT), Crossed immunoelectrophoresis (CIE), Rocket immunoelectrophoresis (RIE), Indirect agglutination (Latex co-agglutination, Passive haemagglutination (PHA), Reversed passive haemagglutination (RPHA)}, Haemagglutination, Complement fixation test, immunoperoxidase test (IPT), Fluorescent antibody technique (FAT), Enzyme linked immunosorbent assay (ELISA), Cell mediated immune (CMI) response, Veterinary biologicals (visits and appraisal).



## SEMESTER V

**Course Title** : **Systematic Veterinary Bacteriology And Mycology**  
**Course No.** : **VMC-311** **Credit Hours** : 2+1=3

### **I. SYLLABUS**

#### ***THEORY***

Study of following important pathogenic bacteria and fungi in relation to their morphology, isolation, growth colonial, biochemical and antigenic characters. Pathogenicity and diagnosis of bacterial and fungal disease caused by the following genera:

Bacteria: Staphylococcus, Streptococcus, Bacillus, Clostridium, Mycobacterium, Enterobacteriaceae (E. coli, Salmonella, Yersinia, Klebsiella and Proteus), Campylobacter, Brucella, Pasteurella and Mannheimia, Pseudomonas and Burkholderia, Moraxella, Haemophilus and Taylorella, Listeria, Actinobacillus, Actinomyces, Arcanobacterium and Corynebacterium, Nocardia, Dermatophilus, Spirochetes, Gram negative anaerobes, Mycoplasma, Rickettsia, Chlamydia and Chlamydophila.

Fungi: Dermatophytes, Rhinosporidium, Sporotrichum, Candida, Mycetomal fungi. Cryptococcus, Aspergillus, Zygomycetes and Dimorphic fungi. Mycotic mastitis and abortion, Mycotoxicoses.

#### ***PRACTICAL***

Laboratory identification of agents of mastitis, Haemorrhagic septicaemia, Enteric infections, Brucellosis, Tuberculosis and Johne's disease, Clostridial infections, Wooden tongue and Lumpy jaw, Anthrax, Glanders, Aspergillosis, Dermatophytosis, Demonstration of other agents of importance (Phycomycetes, yeasts etc.).

## SEMESTER VI

### **Veterinary Microbiology Paper-II**

**Course Title** : **Systematic Veterinary Virology**  
**Course No.** : **VMC-321** **Credit Hours** : 2+1=3

### **I. SYLLABUS**

#### ***THEORY***

Brief history, classification and characteristics of various families of DNA and RNA viruses causing diseases in livestock and poultry, laboratory diagnostic techniques, immunity to viral infections, systemic virology including: DNA viruses: Poxviridae: Pox viruses of cow, sheep, goat and fowl. Asfarviridae: African swine fever, Herpesviridae: Aujeszky's disease, malignant catarrhal fever, infectious bovine rhinotracheitis, equine abortion, Marek's disease, infectious laryngotracheitis. Adenoviridae – Infectious canine hepatitis, egg drop syndrome (EDS), inclusion body hepatitis – Hydropericardium syndrome (IBH-HPS). Papillomaviridae: Papillomatosis, Parvoviridae: Canine Parvovirus. Circoviridae: Chicken infectious anaemia. RNA viruses: orhomyxoviridae: Swine, equine and Avian influenza. Paramyxoviridae: Rinderpest, PPR, canine distemper and Ranikhet disease, Flaviviridae: Classical swine fever, bovine viral diarrhea. Picornaviridae: foot and mouth disease (FMD), duck viral hepatitis, Rhabdoviridae: - Rabies, vesicular stomatitis, ephemeral fever, Coronaviridae: - Avian infectious bronchitis, transmissible gastroenteritis, Togaviridae: - Equine encephalitis, Arteriviridae: equine viral arteritis, caliciviridae: vesicular exanthema, Retroviridae: Avian leucosis group. Lentiviruses – Equine infectious anemia virus, Sheep pulmonary adenomatosis, Maedi/visna. Reoviridae: African horse sickness and blue tongue, Calf Rotavirus, Birnaviridae: Infectious Bursal Disease, Prions, Exotic and emerging animal and poultry viruses.

#### ***PRACTICAL***

Glassware and media preparation, Demonstration of Cell culture, Virus propagation by egg inoculation, animal inoculation and cell culture, study of cytopathogenesis, viral inclusions, diagnostic procedures, serological techniques, preservation and transportation of clinical samples for virological investigations. Diagnostic procedures for Peste des petits ruminants (PPR), FMD, Ranikhet disease (RD), Blue tongue, Infectious bronchitis (IB), Infectious bursal disease (IBD) and other viral agents.

# DEPARTMENT OF VETERINARY PATHOLOGY

## SEMESTER III

Course Title	:	General Veterinary Pathology
Course No.	:	VPP-211
Credit hours	:	1+1=2

### I. SYLLABUS

#### *THEORY*

Introduction and scope of Veterinary Pathology, Brief outline of major intrinsic and extrinsic causes of disease. Pathology of hyperemia, congestion, hemorrhage, edema, thrombosis, embolism, infarction and shock.

Acute cellular swelling and its variants. Glycogen overload and fatty change, Heat shock proteins and lysosomal storage diseases.

Causes and mechanism of reversible and irreversible cell injury, necrosis and its types, apoptosis, differences between post- mortem autolysis and necrosis. Gangrene, Major exogenous and endogenous pigments. Metastatic and dystrophic calcification,

Jaundice in animals, Photosensitization dermatitis. Aplasia, hypoplasia, atrophy, hypertrophy, hyperplasia, metaplasia and dysplasia. Inflammation: definitions, classification, various cell types and their functions, mediators, cardinal signs and systemic effects.

Cell cycle and cyclins, soluble and insoluble mediators (including growth factors).

Wound healing by primary and secondary intention. Pathology of autoimmune diseases and amyloidosis. Definitions, general characteristics and classification of neoplasms. Differences between benign and malignant tumours. Etiology and spread of neoplasms, immunity and neoplasia, effects and diagnosis of neoplasia, stages and grades of neoplasms.

#### *PRACTICAL*

Study of gross pathological specimens and recognition of pathological lesions. Post- mortem (P.M.) technique, Collection of morbid materials for pathological diagnosis. Techniques for preservation and dispatch of materials. Section cutting. Staining and identification of microscopic lesions. Examination of slides depicting changes in cells and tissues. Study of histopathological slides showing haemorrhage, congestion, oedema, infarction, hyperplasia, metaplasia, hypertrophy, necrosis, cloudy swelling, amyloid degeneration, fatty changes, calcification, infiltration etc. Examination and interpretation of oncological tissue slides.

## SEMESTER IV

Course Title	:	Systemic Veterinary Pathology
Course No.	:	VPP-221
Credit hours	:	2+1=3

### 1. SYLLABUS

#### *THEORY*

Pathological changes including neoplasms in non- infectious disease conditions affecting Digestive System (mouth, pharynx, salivary glands, oesophagus, stomach, intestines, liver, gall bladder, pancreas), Respiratory System (nasal cavity, larynx, bronchi, trachea, lungs and pleura), Musculo- skeletal system (muscle, bone, joints, ligaments, tendons), Cardio- vascular System (pericardium, myocardium, epicardium, endocardium, arteries, veins), Haemopoietic System (bone marrow), Lymphoid System

(lymph nodes, vessels and spleen), Urinary System (kidneys, ureter, bladder and urethra), Reproductive System (male and female genital organs), Nervous System (brain, spinal cord and peripheral nervous system), Endocrine System (adrenal, thyroid, thymus, pituitary, parathyroid and pancreas), skin and appendages (hoof and horn), Ear and Eye.

### **PRACTICAL**

Post- mortem examination of large and small animals, recording of gross lesions and compiling the post-mortem report (including vetero- legal cases), dispatch of morbid material in vetero- legal cases, study of gross specimens and histopathological slides pertaining to systemic pathology. Collection and examination of clinico- pathological specimens (blood, urine, body fluids, etc.) for diagnosis of systemic affections.

## **SEMESTER V**

### **Veterinary Pathology Paper-II**

**Course Title** : **Special Veterinary Pathology**  
**Course No.** : **VPP-311**  
**Credit hours** : **2+1=3**

### **I. SYLLABUS**

#### **THEORY**

General pathology of viral infections. Pathogenesis, gross and microscopic pathology of Foot and mouth disease, rinderpest, malignant catarrhal fever, blue tongue, infectious bovine rhinotracheitis, bovine viral diarrhea, caprine encephalitis- arthritis complex, PPR, equine infectious anaemia, equine influenza, equine viral arteritis, equine rhinopneumonitis. African horse sickness, classical swine fever, Aujeszky's disease, swine influenza, rabies, canine distemper, infectious canine hepatitis, canine parvovirus, feline panleukopenia, maedi, jaagsiekte, scrapie, bovine and feline spongiform encephalopathies, pox virus diseases in different animals. Vesicular stomatitis, vesicular exanthema, equine encephalomyelitis, diseases caused by rota and corona viruses.

General pathology of bacterial infections, pathogenesis, gross and microscopic pathology of Tuberculosis, John's disease, actinomycosis, actinobacillosis, anthrax, clostridial group of diseases, streptococcosis including strangles in horses, staphylococcosis, glanders, pasteurellosis, leptospirosis, listeriosis, swine erysipelas, brucellosis, corynebacterium infections, nocardiosis, campylobacteriosis, hemophilus, salmonellosis and colibacillosis in swine.

General pathology of mycoplasmal, chlamydial and rickettsial infections and their differentiation. Pathogenesis, gross and microscopic pathology of contagious bovine pleuropneumonia (CBPP), contagious caprine pleuropneumonia (CCPP), porcine enzootic pneumonia, chlamydial group of diseases and anaplasmosis, Q- fever and ehrlichiosis.

General pathology of mycotic infections. Pathogenesis, gross and microscopic pathology of superficial and deep mycoses- ringworm, favus, aspergillosis, zygomycosis, histoplasmosis, cryptococcosis and candidiasis.

General pathology of helminthic and protozoal infections. Pathogenesis, gross and microscopic pathology of fascioliasis, amphistomiasis, ascariasis, strongylosis, hemonchosis, spirocercosis, filariasis, hookworm, tapeworm infections, coccidiosis, toxoplasmosis, babesiosis, theileriasis and trypanosomiasis.

Pathological changes in nutritional and metabolic diseases. (Deficiency/ excess of carbohydrates, proteins, fats, minerals and vitamins and in conditions like milk fever, pregnancy toxemia, post-parturient hemoglobinuria, ketosis, hypomagnesemic tetany, azoturia, piglet anaemia and sway back/ enzootic ataxia and Rheumatism like syndrome).

General pathology of toxicosis. Pathogenesis, gross and microscopic pathology of heavy metal toxicities like arsenic, copper, lead, mercury, cadmium, strychnine, nitrate/ nitrite, hydrocyanic acid (HCN), fluoride, oxalate toxicities, insecticide/ pesticide poisoning, pathogenesis, gross and microscopic pathology of aflatoxicosis, ochratoxicosis, trichothecosis and ergototoxicosis, Pathology of exotic and emerging diseases.

## **PRACTICAL**

Post-mortem examination of large and small animals for diagnosis of special diseases. Study of gross lesions particularly those of pathognomonic significance. Study of histopathological slides pertaining to special pathology including special staining of causative agents. Study of rapid diagnostic techniques like biopsy exfoliative cytology and frozen sectioning.

## **SEMESTER VI**

**Course Title** : **Avian Pathology**  
**Course No.** : **VPP-321**  
**Credit hours** : **1+1=2**

### **1. SYLLABUS**

#### **THEORY**

**Viral Diseases:** Pathogenesis, gross and microscopic pathology of Ranikhet disease, infectious bursal disease, infectious bronchitis, infectious laryngotracheitis, fowl pox, avian influenza, Marek's disease. Leukosis/ sarcoma group diseases, avian encephalomyelitis, inclusion body hepatitis, hydropericardium syndrome, chicken infectious anaemia. avian nephritis, egg drop syndrome, infectious stunting syndrome, reovirus infections.

**Bacterial Diseases:** Pathogenesis, gross and microscopic pathology of colibacillosis (colisepticaemia, yolk sac infection, egg peritonitis, coligranuloma), infectious coryza, clostridial diseases (botulism, necrotic enteritis, gangrenous dermatitis, ulcerative enteritis), salmonellosis (pullorum disease, fowl typhoid, paratyphoid infection), fowl cholera, tuberculosis and spirochaetosis.

**Mycoplasmal and Chlamydial Diseases:** Pathogenesis, gross and microscopic pathology of *Mycoplasma gallisepticum* infection (chronic respiratory disease), *Mycoplasma synoviae* infection, Avian chlamydiosis (psittacosis).

**Fungal Diseases:** Pathogenesis, gross and microscopic pathology of aspergillosis, thrush and favus.

**Mycotoxicosis:** Pathogenesis, gross and microscopic pathology of Aflatoxicosis, ochratoxicosis and trichothecosis.

**Parasitic Diseases:** Pathogenesis, gross and microscopic pathology of Helminthic diseases (flukes, cestodes, nematodes), protozoal diseases (coccidiosis, histomoniasis), ectoparasites, avian malaria.

**Nutritional and metabolic diseases:** Pathogenesis, gross and microscopic pathology of major diseases due to deficiency/excess of carbohydrates, proteins, minerals and vitamins in poultry.

**Vices and Miscellaneous Diseases:** Pathology of important vices and miscellaneous conditions. Pathology of exotic and emerging poultry diseases.

#### **PRACTICAL**

Post mortem examination and diagnosis of poultry diseases based upon clinical signs and gross lesions. Writing of postmortem report. Collection, preservation and dispatch of morbid materials in poultry diseases. Clinical examination of blood, faeces and other tissues/fluids for poultry disease diagnosis. Submission of feed samples for analysis.

Study of gross specimens and histopathological slides of different diseases of poultry.

## SEMESTER VI

**Course Title** : Aquatic Animal Diseases, Health Care And Management.  
**Course No.** : VPP-322  
**Credit hours** : 1+1=2

### ***I. SYLLABUS***

#### ***THEORY***

Introduction to aquatic animals, aquatic animal ecology and national economy. Fishery as a method of recycling animal and poultry wastes and feed surplus. Types of common aquatics animals, fresh and saline water fish, their collection. Care and breeding, egg and spawn management. Integrated aquaculture. Ornamental fisheries. Aquatic animal feeds and feeding. Economic production; Pond and nursery management. Inland and marine capture fisheries. Stock assessment and population dynamics. Fish harvesting and process technology, fish preservation, inspection, utilization of fish in animal feed. Anatomy, physiology, immunology and inflammatory response in finfish and shellfish (Crustaceans and mollusks).

OIE regulations related to aquatic animal health.

Viral, bacterial, mycotic and parasitic diseases affecting aquatic animals. Nutritional and toxic pathology, miscellaneous non- infectious diseases associated with physicochemical abnormalities of water. Neoplasia of teleosts.

Vaccines and vaccination.

#### ***PRACTICAL***

Identification of culturable fishes. Techniques to study growth and age in fishes. Composite fish culture techniques. Management of artificial diets, induced breeding techniques. Determination of hydrological parameters, qualitative and quantitative analysis of phyto- and zoo- planktons. Fishing gears and crafts. Management of a typical fish farm.

Normal anatomy and histology of finfish and shellfish, Ante- mortem and post- mortem examination of fish. Hematology. Histopathology of important viral, bacterial, fungal and parasitic diseases. Visit to organized fishery.

**(To be taught jointly with Departments of Livestock Production Management and Veterinary Medicine)**

# VETERINARY PUBLIC HEALTH & EPIDEMIOLOGY

## SEMESTER V

### Veterinary Public Health & Epidemiology Paper-I

Course Title : Milk and Meat Hygiene, Food Safety and Public Health  
Course No. : VPE-311  
Credit hours : 2+1=3

### ***I. SYLLABUS***

#### ***THEORY***

Milk hygiene in relation to public health. Microbial flora of milk and milk products. Sources of milk contamination during collection and transport of milk and processing of dairy products. Control of milk and milk product contamination. Hygienic handling/ management of dairy equipment. Quality control of milk and milk products. Milk hygiene practices in India and other countries. Legislation and standards for milk and milk products. Milk as a source of disease transmission.

Pathological conditions associated with the transport of food animals. Elements of meat inspection. Hygiene in abattoirs. Ante-mortem inspection of meat animals. Humane slaughter of animals. Post-mortem inspection of meat animals. Methods of inspection of meat. Rigor mortis and examination of lymph nodes. Speciation of meat. Health implication of emergency and causality slaughter. Hygienic disposal of unsound meat. Inspection of poultry and aquatic foods (fish) for human consumption.

Occupational health hazards in meat processing plants. Meat as sources of disease transmission. Food safety, definition, hazard analysis and critical control point (HACC) system. Chemical and microbial toxicities associated with milk, meat and aquatic foods. Risk analysis: assessment and management and food safety measures. Toxic residues: pesticides, antibiotics, metals and hormones in food and their health hazards. Toxic residues: microbial toxins in food and their health hazards. Types of bio-hazards. Sanitary and phytosanitary measures in relation to foods of animal origin. Sanitary and phytosanitary measures in relation to foods of animal origin and aquatic foods. International and national food safety standards. Office international des Epizooties (OIE). World Trade Organization (WTO). Sanitary and phytosanitary (SPS) and Codex Alimentarius.

#### ***PRACTICAL***

Sanitary collection of samples for chemical and bacteriological examination. Grading of milk by MBR test. Test for pasteurization and plant sanitation. Microbiological examination of raw and pasteurized milk, milk products and water. Standard plate, coliform, faecal streptococcal, psychrophilic, mesophilic and thermophilic counts. Detection of adulterants and preservatives in milk and milk products. Isolation and identification of organisms of public health significance from milk. Visit to abattoir meat processing plants, marketing centers and food service establishment. Ante-mortem inspection of food animals. Post mortem inspection of food animals. Methods of slaughter (demonstration at the slaughter houses). Demonstration of speciation of meat. Physical and bacteriological quality of meat. Physical and bacteriological quality of aquatic foods (fish). Demonstration of toxic chemical residues in milk and meat. Demonstration of toxic microbiological residues in milk and meat.

## SEMESTER VI

**Course Title :** Veterinary Epidemiology And Zoonoses  
**Course No. :** VPE-321  
**Credit hours :** 2+1=3

### **I. SYLLABUS**

#### ***THEORY***

Definitions and aims of epidemiology. Factors influencing occurrence of livestock diseases and production. Ecological basis and natural history of diseases. Sources, Storage, retrieval and representation of disease information/data. Epidemiological hypothesis. Epidemiological methods: descriptive, analytical (observational), experimental, theoretical (modeling), serological and molecular. Survey of animal diseases, Surveillance and monitoring of livestock diseases. Animal disease forecasting. Strategies of disease management, prevention, control and eradication. Economics of animal diseases. National and International regulations on livestock diseases. Role of OIE and laws on international trade on animals and animal products.

Definition, history and socio-economic impact of zoonotic diseases. Classification of zoonoses and approaches to their management. New, emerging, re-emerging and occupational zoonotic. Role of domestic, wild, pet and laboratory animals and birds in transmission of zoonoses. Zoonotic pathogens as agents of bio-terrorism. Reservoirs. Clinical manifestations in animals and humans, and the management of the following zoonoses: Rabies, Japanese encephalitis, Kyasanur forest disease, Influenza, Anthrax, Brucellosis, Tuberculosis, Leptospirosis, Listeriosis, Plague, Rickettsiosis, Chlamydiosis and Dermatophytosis. Food borne zoonoses: Sallmonellosis, Staphylococcosis, Clostridial food poisoning, Campylobacteriosis, Helminthosis, Toxoplasmosis and Sarcocystosis. Veterinary Public Health Administration.

#### ***PRACTICAL***

Collection of epidemiological samples. Measurement of disease: determination of morbidity and mortality rates/ratios. Generation of epidemiological protocols and reports. Demonstration of selected software programmes/models, e.g. EPIZOO, HandiSTATUS and India-Admas-EPITRAX. Evaluation of vaccines and diagnostic tests. Determination of Associations and risks: relative risk, Odd's ratio and attributable risk. Survey of an animal disease on a farm.

Field survey of zoonotic diseases. Concurrent isolation and identification of important pathogens of zoonotic importance from animal and human sources including foods of animal origin and their interpretation. Study of rural environment and health status of rural community. Visit to primary health centre/human hospital and study of the common diseases affecting rural/urban population, and probable relationships of these human disease conditions with animal diseases present in the area.

## SEMESTER IX

**Course Title :** Environment and Environmental Hygiene  
**Course No. :** VPE-511  
**Credit Hours :** 2+1 = 3

### **I. SYLLABUS**

#### ***THEORY***

Definition, scope and importance. Ecosystem: types, structure and functions. Food chains. Bio-diversity: uses, threat and conservation. Natural resources: forest, mineral, soil and water-their uses and abuses. Environmental pollution-causes, and effects. Control measures of air, water, soil, marine, thermal and noise pollution. Nuclear hazards. Bio-safety and risk assessment. Environment Protection Acts and related issues. Disaster management.

Sources of water supply and water quality. Sources of water contamination. Bacteriology of water. Physical, chemical, microbiological and biological evaluation of water. Water purification. Disposal of

sewage and farm wastes. Health implications of farm wastes. Sanitation and disinfection of animal houses. Recycling of farm wastes. Sources of air pollution within animal houses and its effect on animal health and production. Ventilation and ventilation systems within animal houses and specialized laboratories. Prevention and control of air and water borne diseases. Problems of atmospheric pollution (acid rain, depletion of ozone layer, methane production, green house effect and global warming). Tannery, wool, bone and blood meal industry pollution and its control. Stray and fallen animal management. Pollution due to industrial waste.

### ***PRACTICAL***

Sampling of water for sanitary examination. Physical examination of water: Estimation of colour, turbidity and total hardness. Physical examination of water: Solids, alkalinity and acidity of water. Chemical and microbiological evaluation of water quality. Disinfection of animal houses. Determination of the efficacy of disinfectants. Demonstration of water purification system. Disposal of carcasses. Pathogenic microbes in air. Demonstration of various ventilation systems in animal houses. Demonstration of toxic residues in water and air. Visit to local polluted sites and documentation of local environmental problems.



# DEPARTMENT OF ANIMAL NUTRITION

## SEMESTER I

Course Title	:	Principles of Animal Nutrition and Feed Technology
Course No.	:	ANN-111
Credit Hours	:	2+1=3

### I. SYLLABUS

#### *THEORY*

Importance of nutrients in animal production and health. Composition of animal body and plants. Nutritional terms and their definitions. Importance of minerals (major and trace elements) and vitamins in health and production, their requirements and supplementation in feed. Common feeds and fodders, their classification, availability and importance for livestock and poultry production. Measures of food energy and their applications – gross energy, digestible energy, metabolisable energy, net energy, total digestible nutrients, starch equivalent, food units, physiological fuel value. Direct and indirect calorimetry, carbon and nitrogen balance studies. Protein evaluation of feeds-Measures of protein quality in ruminants and non-ruminants, biological value of protein, protein efficiency ratio, protein equivalent, digestible crude protein. Calorie protein ratio. Nutritive ratio. Various physical, chemical and biological methods of feed processing for improving the nutritive value of inferior quality roughages, Preparation, storage and conservation of livestock feed through silage and hay and their uses in livestock feeding. Harmful natural constituents and common adulterants of feed and fodders. Feed additives in the rations of livestock and poultry. Antibiotics and hormonal compounds and other growth stimulants and their uses.

#### *PRACTICAL*

Familiarisation of various feed stuff, fodders and their selection. Preparation and processing of samples for chemical analysis-herbage, faeces, urine and silages. Weende's system of analysis-Estimation of dry matter, total ash, acid insoluble ash, crude protein, ether extract, crude fibre, nitrogen free extract, calcium and phosphorus in feed samples. Demonstration of detergent methods of forage analysis. Qualitative detection of undesirable constituents and common adulterants of feed. Demonstration of laboratory ensiling of green fodders, Silage pit preparation.

## SEMESTER II

Course Title	:	Applied Nutrition- 1 (Ruminants)
Course No.	:	ANN-121
Credit Hours	:	2+1=3

### I. SYLLABUS

#### *THEORY*

Importance of scientific feeding conducting/Feeding experiments. Digestion and metabolism trial. Norms adopted in conducting digestion trial. Measurements of digestibility. Factors affecting digestibility of a feed. Feeding standards, their uses and significance, Merit and demerits of various feeding standards with reference to ruminants. Nutrients requirements of livestock energy and protein requirement for maintenance and production. Methods adopted for arriving at energy and protein requirements for maintenance and production in terms of growth, reproduction milk, meat wool and work. Balanced ration and its characteristics, general principles of computation of rations. Formulation of rations and feeding of dairy cattle and buffaloes during different phases of growth, development and production (neonate, young, mature, pregnant, lactating and dry animals; breeding bull and working animals). Formulation of ration and feeding of sheep and goat during different phases of growth, development and production (milk, meat and wool). Use of NPN compound for ruminants.

## ***PRACTICAL***

Demonstration of conducting digestion trial in ruminants. Calculation of nutritive value of different feedstuffs in terms of digestible crude protein (DCP), total digestible nutrient (TDN), nitrogen retention (NR) and starch equivalent (SE). Calculation of requirements of nutrients in terms of DCP, TDN and metabolisable energy (ME) for maintenance, growth and other types of production like meat, milk, wool, reproduction and work. Formulation of rations for different categories of livestock under different conditions. Demonstration of the methods for improving the nutritive quality of straws and other crop residues. Formulation of rations for feeding of livestock during scarcity periods. Visit to feed factories.

## **SEMESTER III**

**Course Title** : **Applied Nutrition-II  
(Non ruminants, Poultry and Laboratory Animals)**  
**Course No.** : **ANN-211**  
**Credit Hours** : **2+1=3**

### ***I. SYLLABUS***

#### ***THEORY***

Factors affecting digestibility of a feed. Nutrient requirements in poultry. Swine and equine-energy and protein requirement for maintenance and production. Methods adopted for arriving at energy and protein requirements for maintenance and production in terms of growth, reproduction and production (egg, meat and work). Formulation of rations as per Bureau of Indian Standards (BIS), National Research Council (NRC) and Agricultural Research Council (ARC) specifications. Feeding standards, their uses and significance, merit and demerits of various feeding standards with reference to non ruminant animals and poultry. Feeding of swine (Piglets, growers, lactating and pregnant sows, breeding boar, fattening animals), equine (Foal, yearling, brood mare, stallion and race horses) and poultry (starter, growers, broilers, layers) with conventional and unconventional feed ingredients. Feeding of ducks. Laboratory animal nutrition: nutrient requirements of mice, rat, rabbit and guinea pig. Significance of carbohydrates, lipids, proteins and amino acids, minerals and vitamins in lab animal nutrition. Diet formulation and preparation and feeding practices. Feed supplements.

#### ***PRACTICAL***

Calculation of requirements of nutrients in terms of DCP, TDN and ME for maintenance, growth, reproduction and other types of production like egg and meat. Formulation of rations for poultry and swine with conventional and unconventional feed ingredients. Principles of compounding and mixing of feeds. Visit to poultry farms.

# DEPARTMENT OF ANIMAL GENETICS & ANIMAL BREEDING

## SEMESTER I

Course Title : Bio- Statistics and Computer Application  
Course No. : AGB-111  
Credit Hours : 2+1=3

### I. SYLLABUS

#### THEORY

##### A. Basic Statistics

Introduction and importance, Statistics, parameters, observation, recording and graphical representation of data. Probability and probability distributions: binomial, Poisson and normal. Measures of central tendency and measures of dispersion (simple and grouped data) : Moments and skewness to kurtosis. Correlation and regression. Tests of hypothesis and t, Z,  $X^2$  and F tests of significance and their inter-relationship. Livestock census procedure and census. Introduction to sample survey methods for livestock and livestock products. Bioassay – meaning and uses.

B. *Experimental Designs*: Completely Randomized Design (C.R.D.). Analysis of variance.

##### C. Computer Application

Computer and its components; types of computers; Hardware, software, human ware and firm ware. Type of memories. Computer languages and their scope and limitations. Computer programming: data types: Constants, variables, expressions, operations, functions, flow charts, commands, simple programs and their execution- scope and limitations. Data base management system: Storage of data, filing retrieving, reproduction. Use of computer in animal husbandry and veterinary practices.

#### PRACTICAL

Systematic approach of data, tabulation, simple probability problems. Estimation of measures of central tendency (mean, median, mode) and estimation of measures of dispersion (variance, standard deviation, standard error and coefficient of variation) : for simple and grouped data. Graphical representation of data. Tests of significance- t, Z,  $X^2$  and F tests. Estimation of correlation. Estimation of regression. Analysis of variance: C.R.D., R.B.D. Computer basics and components of computer. Simple operation: Entering and saving biological data, database management systems. MS-Office. Spread sheet, Internet, e-mail and geographic information system (GIS).

#### DEMONSTRATION

Use of word processor and spreadsheet. Graphics and their uses. Data retrieving and analysis through computer (Data base). Use of local area network (LAN) and other network systems. Retrieving library information through network. G.I.S. and its use.

## SEMESTER II

Course Title : Principles Of Animal Genetics And Population Genetics  
Course No. : AGB – 121  
Credit Hours : 2 + 1=3

### I. SYLLABUS

#### THEORY

History of Genetics, Chromosome numbers and types in livestock and poultry, Mltosis, Meiosis and gametogenesis. Overview of Mendelian principles; Modified Mendelian inheritance: gene interaction; multiple alleles; lethals; sex-linked, sex limited and sex influenced traits; linkage and crossing over,

Mutation, Chromosomal aberrations; Cytogenetics, Extra-chromosomal inheritance. Gene concept – classical and molecular.

Population genetics: Forces (e.g. Mutation, migration, selection and drift) changing gene and genotypic frequencies.

Quantitative genetics; Nature and properties; Values and means, Components of phenotypic and genotypic variance; Concept of genotype and environment interaction, resemblance between relatives; Heritability, repeatability, genetic and phenotypic correlations.

### ***PRACTICAL***

Demonstration of Karyotype of Farm animal species; Solving problems on inheritance of Mendelian traits, Linkage and Crossing over. Calculation of gene and genotypic frequencies, Testing a population for Hardy-Weinberg equilibrium; Calculation of effects of various forces that change gene frequencies; computation of population mean; Estimation of heritability, repeatability, Most probable producing ability (MPPA), genetic and phenotypic correlations.

## **SEMESTER III**

<b>Course Title</b>	<b>:</b>	<b>Livestock and Poultry Breeding</b>
<b>Course No.</b>	<b>:</b>	<b>VGB – 211</b>
<b>Credite Hours</b>	<b>:</b>	<b>2 + 1 = 3</b>

### ***I. SYLLABUS***

#### ***THEORY***

History of Animal Breeding; Classification of breeds; Economic characters of livestock and poultry and their importance; Breeding/selection techniques for optimal production. Selection: Response to selection and factors affecting it; Basis of selection individual, pedigree, family, sib, progeny and combined; Indirect selection; Multi-trait selection.

Classification of mating systems; Inbreeding and outbreeding- genetic and phenotypic consequences viz., inbreeding depression and heterosis: Systems of utilization of heterosis; combining ability; Breeding methods for the improvement of dairy cattle and buffaloes (crossbreeding, sire evaluation, field progeny testing, open nucleus breeding system (ONBS), sheep goat, swing and poultry; Breed development; Conservation of germplasm, Current livestock and poultry breeding programmes in the state and country.

#### ***PRACTICAL***

Description and measurement of economic traits of livestock and poultry. Standardization of performance records, Computation of selection differential, generation interval and expected genetic gain; Construction of selection index; Sire indices, Measurement of inbreeding and relationship coefficients; Estimation of heterosis.

# DEPARTMENT OF LIVESTOCK PRODUCTION AND MANAGEMENT

## SEMESTER I

Course Title	:	Livestock Production Management-I (General Principles and Ruminants)
Course No.	:	LPM-111
Credits Hours	:	3+1=4

### ***I. SYLLABUS***

#### ***THEORY***

Livestock in India association of livestock to Indian society during vedic, medieval and modern era. Demographic distribution of livestock and role in economy. Animal holding and land holding patterns in different agro-ecologies.

Introductory animal husbandry. Common animal husbandry terms. Body conformation and identification. Dentition and ageing of animals. Transport of livestock by rail, road, air and on foot. Common farm management practices including disinfection, isolation, quarantine and disposal of carcass. Introduction to method of drug administration. Common vices of animals, their prevention and care. Livestock production of different agro-climatic zones. Livestock resources and resources management. Livestock produce and products and their availability and their role in rural/ urban health/ economy. Organic livestock production.

General principles affecting the design and construction of building for housing for various livestock species. Selection of site. Arrangements of the building with special reference to Indian conditions. Utilisation of local materials. Building materials used for construction of wall, roof and floor of animal houses, their characteristics, merits and demerits.

Demography of cattle and buffalo population. Breeds and descriptors of important breeds. Important traits of cattle and buffaloes. General management and feeding practices of calves, heifers, pregnant lactation and dry animals and bulls and working animals. Draughtability of cattle and buffaloes. Raising of buffalo males for meat production. Housing systems, layout and design of different buildings for dairy animals including backyard dairy and mixed farms. Routine dairy farm operations and labour management. Methods of milking and precautions. Factors affecting quality and quantity of milk production. Clean milk production. Dairy farm accounts and records. Concepts of input and output cost of dairy farming. (small and large holdings).

Demography of sheep and goat population and their role in economy. Breeds and breed descriptors. Important traits for meat, milk and fibre. General management and feeding practices during different stages of growth, development and production (milk, meat and wool) in small and large holdings. Breeding schedule and management of ram and buck. Weaning and fattening of lambs and kids. Glossaries of terms in wool industry. Shearing of Sheep. Physical and chemical properties of wool. Impurities of wool. Factors influencing the quality of wool. Wool grading. Recovery of wool wax and its use. Housing systems, layout and design of different buildings for small ruminants. Judging for the quality and confirmation of body parts of cattle, buffalo, sheep and goat. Culling of animals. Preparation of animals for show.

Problems and prospects of dairy, meat and wool industry in India. Animal and animal products market and marketing. Animal Fairs and melas. Animal pounds and Goshalas.

#### ***PRACTICAL***

Identification of various breeds of cattle, buffalo, sheep and goat. Familiarization with body points of animals. Approaching, handling and restraining of cattle, buffalo, sheep and goat. Clipping, shearing, dipping, spraying and spotting sick animals. Detection of vices. Feeding of animals. Methods of identification (marking, tattooing, branding, tagging and electronic chip). Determination of age. Determination of body weight using different measurements. Preparation of animals for show and

judging. Layout plans for dairy and sheep/ goat farms. Familiarization with routine farm operations. Selection and culling of animals. Milking of dairy animals. Training of breeding males. Detection of heat identification and care of pregnant animals. Care of neonatal and young stock. Maintenance, cost accounting, and care of pregnant animals. Care of neonatal and young stock. Maintenance, cost accounting, economic analysis and preparation of balance sheet of dairy and sheep/ goat farm records. Structure of wool and its differentiation from hair fibre. Determination of staple length, crimps, diameter and strength of wool fibre. Sorting, packaging and grading of wool. Recovery of wax from wool. Scouring and carbonization of wool. Visit to different animal farms/ demonstration centres/ individual rural, urban and peri-urban animal units/ wool production centres and industries/ wool, meat and live animal markets. Preparation of project proposal.

## **SEMESTER II**

**Course Title** : **Fodder Production and Grassland Management**  
**Course No.** : **LPM -121**  
**Credits Hours** : **1+1=2**

### ***I. SYLLABUS***

#### ***THEORY***

Importance of grasslands and fodders in livestock production. Agronomical practices for production of leguminous and non leguminous fodders in different seasons. Soil and water conservation and irrigation drainage for fodder production. Farm power and agro-energy. Farm machinery and equipment. Harvesting and post harvest techniques for fodder preservation. Storage of feeds and fodders. Scarcity fodders. Feed and fodder management for individual animals. Fodder production for small units through inter cropping or back yard cultivation. Recycling of animals washings and wastes in fodder production.

#### ***PRACTICAL***

Visit to the fodder farm. Familiarization with the various types of fodder crops utilized in the state and the samples of fodder in India. Fodder cropping routines – familiarization, collection, preservation and storage of feed and fodder, possible damages /loss and methods to prevent them. Cost calculations of fodder production. Familiarizations with the back yard fodder cropping and intercropping of fodder Livestock waste utilization and recycling. Calculation on the economic aspects of fodder cropping and procurement of feed.

**Course Title** : **Livestock Production Management-II  
(Monogastric and Laboratory Animals)**  
**Course No.** : **LPM -122**  
**Credits Hours** : **1+1=2**

### ***I. SYLLABUS***

#### ***THEORY***

Introduction and scope of swine farming in the country. Demography of swine population. Breeds and their role in economy. Management of different categories of swine for optimal production: breeding and pregnant sows: sows at farrowing and after farrowing: pig-lets, growing stock, lactating sows, feedlot stock Mating technique in swine. Housing of swine, swine feeds and feeding. Economics of pig farming. Equine population of India. Horses, donkeys and mules and their utility. Identification of breeds of horses. Dentition and ageing of horses. Handling, restraining, care and routine management of equines including grooming, saddling and exercise. Stable and its management. Feeding routine for horse, donkeys and mules. Vices of horses. Care of stallion. Mating of Horses broodmare and its care. Foaling and care of newborn. Breeding mules. Care of race horses and preparing horses for show. Doping and its detection. Visit to races, polo, horse show.

Importance of laboratory animal breeding care and housing standards of mice, rats and guinea pigs. General considerations on feeding and breeding of laboratory animals. Prophylactic measures for commonly occurring laboratory animal diseases. Concept of production of specific pathogen free (SPF) and germ free laboratory animals.

Scope of rabbit farming in the country, breeds and their distributions in India and abroad. Limitation of rabbit animal production. Selection, care and management of breeding stock for commercial purpose. Identification, Care and management of kindling animals and kindling. Care of new born, growing stock. Harvesting of products. Breeding and selection techniques for optimal production. Feeds and feeding for rabbit production. Housing of rabbit. Shearing/ slaughtering and preservation of products. Diseases and parasite control, hygienic care. Disposal, utilization and recycling of wastes etc. Economic aspects of rabbit production, accounting their expenditure income etc. Manpower requirements and personnel/labour management. Preparing projects for micro (backyard) mini, and major rabbit farms.

### ***PRACTICAL***

Identification of Indian and exotic breeds of swine, handling of swine; Routine inspection, identification of diseases, examination and control of parasites, vaccination, identification of pregnant animals. Care during pregnancy, isolation and care of farrowing sows, care of pig lings, Castration, culling, tooth cutting. Calculation of profits and preparation of feasibility reports and projects for piggery. Layout plans of swine houses; routine operations of swine farms. Marketing of swine. Feeding of swines. Preparation of swines for show and judging.

Identification of body parts and handling of laboratory animals. Housing system and space requirements for laboratory animals. Weighing sexing and weaning of laboratory animals. Marketing of swine. Feeding of swines. Preparation of swines for show and judging.

Identification of body parts and handling animals. Housing system and space requirements for laboratory animals. Weighing, sexing and weaning of laboratory animals. Marking for identification of laboratory animals for purpose of their individual recording. Computation and compounding of balanced diet for laboratory animal mainly Mice, Rats, Guinea-pigs and Rabbits. Feeding schedule of laboratory animals for high breeding efficiency. Maintenance of breeding records of laboratory animals. Prophylactic measures against common disease of lab animals. Hygienic care and control of parasites (routines).

Visit to the University Rabbitary. Handling and restraint. Body parts. Identification of breeds. Judging, Feeds and feeding. Housing requirement and equipment. Farrowing. Care of newly born young ones, tagging, tattooing for identification, Shearing. Dressing of carcass.

Horse riding: walking, trotting, cantering and galloping. Preparation of equines for show and judging. Layout plans for stables.

## **SEMESTER III**

**Course Title : Avian Production Management**

**Course No. : LPM-211**

**Credits Hours : 1+1=2**

### ***I. SYLLABUS***

#### ***THEORY***

Indian Poultry Industry brief outline of the different segments poultry statistics. Classification of poultry, common breeds of poultry including duck, quail, turkey and guinea fowl and their descriptions. Descriptions of indigenous fowls.

Reproduction in fowl, male and female reproduction systems, formation of eggs, structure of eggs. Important economic traits of poultry, egg production, egg weight, egg quality, growth, feed consumption and feed efficiency, fertility and hatchability, plumage characteristics and comb types.

Scavenging system of management, raising of chicks, scavenger feed base of village. Low input technology: backyard and semi intensive unit of various sizes; their description, management and economic achievements.

New colored feathered birds developed in public and private sectors for meat and egg production for rural poultry; their acceptability and assimilation in rural eco-system.

Mixed farming and poultry raising. Concept of self-local market unit. Brooding and rearing practices used for chicken, duck, quail, turkey and guinea fowl. Economic production of chicken and other classes of poultry. Hatching and feeding norms for different species of poultry. Marketing of poultry and poultry products. Setting of farms for different classes of poultry. Organic and hill farming.

### ***PRACTICAL***

Morphological description of common exotic poultry breeds like White Leghorn (WLH), Rhode Island Red (RIR), Plymouth Rock, Cornish and New Hampshire. Diagrammatic illustration of body parts of chicken, duck, quail, guinea fowl and turkey. Descriptive specialties of indigenous birds, listing of its advantageous value in rural areas. Diagrammatic representation of scavenging, backyard and semi intensive units; with habitats, feed base and shelter. Conservation of indigenous germ plasm, listing of conservation techniques. Conservation of indigenous germ plasm, listing of conservation techniques. Demonstration of newly developed breeds in rural environment. Housing, equipments, nesting and brooding requirements. Vaccination, medication and incubation requirements. Preparation of projects for rural people on poultry and other species (duck, quail, guinea fowl and turkey).

## **SEMESTER IV**

<b>Course Title</b>	:	<b>Commercial Poultry Production &amp; Hatchery Management</b>
<b>Course No.</b>	:	<b>LPM -221</b>
<b>Credits Hours</b>	:	<b>1+1=2</b>

### ***I. SYLLABUS***

#### ***THEORY***

Housing: Location & types of poultry houses, advantages and disadvantages of different types of rearing. Space requirement for different age groups under different rearing system, environmentally controlled housing. Brooding management: Brooding, types of brooders, brooding requirements, preparation of brooder house to receive chicks. Feeding and vaccination in early stage of chicks. Rearing and management: Care and management of growing, laying/ broiler birds of breeders and commercial category. Battery cage management, different types and sizes. Litter management: Litter materials, litter borne diseases and its recycling for livestock feeding and power generation. Judging of poultry. Management during summer, rainy and winter season. Management during other stress conditions, modification of housing with other measures, use of light reflectors, insulators, sprinklers and foggers, dietary modification, Vices in poultry with their remedial measures. Water management: Standard for drinking water in terms of total solids, pH, mineral levels, sanitizers and water sanitation. Diseases spread through contaminated water and their prevention. Poultry welfare and behaviour. Biosecurity – Proactive measures like farm fencing, disinfectant, pits, personnel management, restriction of movement etc to minimize entry of infections in farm premises. Feeding: Digestive system and digestion in chicken. Classification of feed, selection of common feed ingredients and their nutrient composition. Nutrient requirement for different categories. Feed formulation: Economics of feed formulation. Cost/ unit nutrient. Feeding systems, feeding management, least cost feeding, feed restriction, separate male feeding. Non-nutrient feed additives including herbal bio-enhancers, anti nutritional factors and toxins in feed. Health Care – common poultry diseases: Bacterial, viral, fungal, parasitic and nutritional deficiencies, vaccination schedule for commercial layers and broilers, factors governing vaccination schedule, vaccination principles type, methods, pre and post vaccination care. Medication: Types of administration, general principles and precautions with emphasis on administering medicine through feed and water. Commonly used drugs in poultry diseases. Disinfection, types of disinfectants, mode of action, recommended procedure, precaution and handling. Economics: Economics of layer and broiler production, projects reports for layers in different systems of rearing, project reports for broilers. Feasibility studies on poultry rearing in context of small units and their profitability. Export / import of poultry & poultry products. Breeder Flock Management: Layer and broiler breeder flock management, housing & space requirements, management during different stages of life cycle, light management



during growing and laying period. Artificial insemination, selection and culling of breeding flocks. Health care: Vaccination of breeder, difference between vaccination schedule of broilers and commercial birds. Common diseases of breeders (Infectious and metabolic disorders), prevention. Fertility disorders- etiology, diagnosis and corrective measures. Economic parameters on returns from breeders like salable chicks/ hen/ production cycle etc. Hatchery practices: Management & principles of incubation. Factors affecting fertility and hatchability, selection, care and incubation of hatching eggs. Fumigation, sanitation and hatchery hygiene. Disposal of hatchery waste. Sexing, grading, packing and dispatch of day old chicks. Economics of hatchery business, trouble shooting hatch failure, importance of hatchery records, break even analysis of unhatched eggs. Bio-security in the hatchery. Computer applications for hatchery management.

### ***PRACTICAL***

Male and female reproductive system. Artificial insemination. Selection of breeder flock. Working of hatchery, incubation requirement; incubators, their working and care. Hatchery layout and equipments. Handling of eggs prior to and during incubation. Candling, fumigation. Project reports of setting up a hatchery. Hatchery records and maintenance. Exposure to commercial broiler and layer farms - different system of housing. Demonstration of litter and cage rearing systems. Feed equipments and maintenance, hammer mill, mixer, pellet mill-types, principle of working, comparison of different types, premix preparations, quality control of raw materials. Feed mill operation. Demonstration of different types of feeder, waterer, fogger, sprinklers etc. Maintenance of farm records. Medication-demonstration of routinely employed methods of administration. Vaccination practice in general and demonstration of different routes of administration in particular.

## **SEMESTER IV**

**Course Title** : **Mule Production and Management**  
**Course No.** : **LPM- 222**  
**Credit hours** : **1+1=2**

### ***I. SYLLABUS***

#### ***THEORY***

Introduction and utility of Mule. Methods of identification, colours and markings in mules. Handling and restraining of mule. Routine management of mules including grooming, clipping, saddling and exercise. Feeding and watering of mules. Selection of Jack & Jennet. Mule breeding and its care. Care and management of pregnant dam and new born. Ageing of mule and dentition. Estimation of body weight. Draught ability of mule. Load and loading equipment. Recent advances on mule. Common terms related to equine husbandry. Common diseases & vaccination of mules. Housing of mules and shelter management.

#### ***PRACTICAL***

Familiarization with the body parts of mules. Visit to remount training school and depot, Hempur/ relevant place. Approaching, handling & restraining of mule. Casting of mules. Estimation of body weight. Loading of mule. Comparison of mule with horse, Dentition and ageing in mule. Shoeing, common managemental practices, grooming, exercise, identification colours and markings. Prevention of diseases in mules.

# DEPARTMENT OF LIVESTOCK PRODUCTS TECHNOLOGY

## SEMESTER V

Course Title	:	Milk and Milk Products Technology
Course No.	:	LPT -311
Credit Hours	:	1+1=2

### I. SYLLABUS

#### *THEORY*

Milk industry in India. Layout of milk processing plant and its management, Composition and nutritive value of milk and factors affecting composition of milk. Physico- chemical properties of milk, Microbiological deterioration of milk and milk products. Collection, chilling, standardization, pasteurization, homogenization, bacto-fugation. Principles of dehydration. Preparation of butter, paneer / channa, ghee, khoa, lassi, dahi, ice-cream, cheddar cheese and dairy byproducts. Good manufacturing practices. Implementation of HACCP. Toxic / pesticides residues in milk and milk products. Packaging, transportation, storage and distribution of milk and milk products. Organic milk food products. Legal and BIS standards of milk and milk products. Sanitation in milk plant.

#### *PRACTICAL*

Sampling of milk, estimation of fat, solid not fat (S.N.F.) and total solids. Platform tests. Cream separation. Detection of adulteration of milk. Determination of efficiency of pasteurization. Microbiological quality evaluation of milk and milk products. Preparation of milk products like curd, ghee, paneer/channa, khoa, ice-cream, milk beverages. Visit to modern milk processing and milk manufacturing plants.

## SEMESTER V

Course Title	:	Abattoir Practices And Animal Products Technology
Course No.	:	LPT-312
Credit Hours	:	1+1=2

### I. SYLLABUS

#### *THEORY*

Layout and management of rural, urban and modern abattoirs. BIS standards on organization and layout of abattoirs. Pre-slaughter care, handling and transport of meat animals including poultry. Ante-mortem and post-mortem examination. Slaughtering and dressing of carcasses. Evaluation, grading and fabrication of dressed carcasses including poultry.

Abattoir byproducts: meat, bone, fish meal and byproducts of pharmaceutical value. Skin and hides; methods of flaying, defects and preservation. Management of organic wastes emanating from animal industries, fallen animals and abattoir effluent. HACCP concepts in abattoir management. Introduction to wool, fur, pelt and specialty fibers with respect to processing industry. Glossary of terms of wool processing. Basic structure and development of wool follicle. Post shearing operations of wool, classification and grading of wool, physical and chemical properties of wool. Impurity of wool, factors influencing the quality of wool, Brief outline of processing of wool. Tests for identification of wool.

#### *PRACTICAL*

Methods of ritual and humane slaughter, flaying and dressing of food animals including poultry. Carcass evaluation. Determination of meat yield, dressing percentage, meat bone ratio and cut up parts. Preparation of different abattoir byproducts. Visit to leather processing unit and slaughter houses/meat plants.

Wool sampling techniques, determination of fleece density, fiber diameter, staple length, crimp and medulation percentage, scouring/ clean fleece yield. Visit to wool production/processing centre.

## SEMESTER VI

**Course Title** : **Meat Science**  
**Course No.** : **LPT -321**  
**Credit Hours** : **1+1=2**

### ***I. SYLLABUS***

#### ***THEORY***

Retrospect and prospect of meat industry in India. Structure and composition of muscle (including poultry muscle), conversion of muscle to meat, nutritive value of meat. Fraudulent substitution of meat, preservation of meat and aquatic foods- drying, salting, curing, smoking, chilling, freezing, canning, irradiation, antibiotics and chemicals. Ageing of meat. Modern processing technologies of meat and meat products. Packaging of meat and meat products. Formulation and development of meat and sea foods kabab, sausages, meat balls/patties, tandoori chicken, soup, pickles, surimi, smoked fish. Physico chemical and microbiological quality of meat and aquatic food and food products. Basics of sensory evaluation of meat products. Nutritive value, preservation, packaging of egg and egg products. Laws governing national / international trade in meat and meat products. Organic meat food products. Food products from genetically modified animals and marine life.

#### ***PRACTICAL***

Chilling/ freezing of meat, meat products and aquatic foods. Ageing of meat, preservation and packaging of meat, aquatic foods, shell eggs and their products. Determination of microbial loads in various animal food products, estimation of deteriorative changes in meat and meat products. Preparation of ready-to-eat meat/ poultry products. Evaluation of external and internal egg quality, preservation technique of eggs.

## DEPARTMENT OF VETERINARY GYNAECOLOGY AND OBSTETRICS

### SEMESTER VII

Course Title : Veterinary Gynaecology  
Course No. : VGO-411  
Credit Hours : 2+1=3

#### ***I. SYLLABUS***

##### ***THEORY***

Clinical evaluation and abnormalities of reproductive tracts in domestic animals. Delayed Puberty and sexual maturity. Estrus detection. Aberrations of estrus and estrous cycle. Seasonal breeding. Pregnancy diagnosis-different methods- in different species. Superfoetation and Superfecundation. Fertility, Infertility & sterility- Anatomical, hereditary, nutritional, managerial, hormonal and infectious causes. Anoestrus, ovulatory defects and cystic ovarian degeneration. Repeat breeding: Fertilization failure, early embryonic mortality. Specific & non-specific infections affecting genital organs-endometritis, cervicitis, vaginitis. Fertility parameters. Sexual health control and reproductive health management. Clinical use of hormones in female infertility. Breeding management, mismating, pseudopregnancy, transmissible venereal tumor (TVT) in bitches.

Induction of estrus, Synchronization of estrus, Follicular Dynamics, Ovulation, Superovulation, and Embryo Transfer Technology. Immuno-modulation for enhancement of fecundity.

##### ***PRACTICAL***

Study of female genitalia and its biometry. Methods of estrus detection in farm and companion animals including vaginal cytology. Collection and examination of vaginal mucus by various techniques. Demonstration of different hormonal preparations and their uses. Different protocols for induction and Synchronization of estrus, Superovulation and embryo transfer. Pregnancy diagnosis and its differential diagnosis. Use of gynaecological instruments and appliances. Evaluation of female animals for breeding soundness. Demonstration of reproductive pathological conditions using museum specimens. Sexual health control, life history card for the female, recording system for reproductive performance. Demonstration of ultrasonographic imaging of reproductive organs and pregnancy. Oocyte collection and grading.

### SEMESTER VIII

Course Title : Veterinary Obstetrics  
Course No. : VGO-421  
Credit Hours : 1+1=2

#### ***I. SYLLABUS***

##### ***THEORY***

Types and functions of placenta in different species. Diseases & accidents during gestation- Abortion in domestic animals-diagnosis & control. Dropsy of foetal membranes and foetus. Foetal mummification, maceration, pyometra and mucometra. Prolonged gestation. Teratology. Premature birth. Uterine torsion. Cervico-vaginal prolapse. Termination of pregnancy. Parturition. Puerperium and involution of uterus in domestic animals. Care and management of dam and newborn.

Dystocia-Types of dystocia – maternal & foetal- approach, diagnosis and treatment. Epidural & other anesthesia in obstetrical practice. Obstetrical operations- mutation, forced extraction, fetotomy and caesarean section. Injuries and diseases in relation to parturition.

Postpartum diseases and complications: uterine prolapse, retention of foetal membranes, metritis, postpartum paraplegia.

Animal birth control- ovariectomy and non surgical interventions.

## ***PRACTICAL***

Study of pelvis and Pelvimetry. Assessment of foetal age. Demonstration of different types of placenta. Use of obstetrical instruments. Epidural and other obstetrical anaesthesia. Manipulation of malpresentation in Phantom Boxes. Approach and treatment of obstetrical cases. Handling of prolapse of genitalia-application of vulvar sutures. Foetotomy. Caesarean section. Post operative care and management of obstetrical cases. Demonstration of ovariohysterectomy.

## **SEMESTER IX**

**Course Title :** Veterinary Andrology and Reproductive Techniques  
**Course No. :** VGO-511  
**Credit Hours :** 1+1=2

### ***I. SYLLABUS***

#### ***THEORY***

Introduction to andrology. Development of male genitalia and gonads. Puberty, sexual maturity, sexual behavior and libido. Factors affecting maturity and sex drive in bulls. Forms of male infertility. Factors causing infertility in male, its diagnosis and treatment. Abnormalities, malformations, diseases of male genitalia and coital injuries, their diagnosis and treatment. Testicular hypoplasia and degeneration. Diseases of the accessory sex glands. Introduction, history, development, advantages and limitations of artificial insemination (A.I). Methods of semen collection in various species. Factors affecting quality and quantity of semen. Macroscopic/physical, microscopic, biochemical and biological tests for evaluation of semen. Extenders used for semen preservation. Extension of semen, preservation of semen at different temperatures. Storage and shipment of semen. Technique of A.I.

#### ***PRACTICAL***

Planning and organization of A.I. Centre. Selection, care, training and maintenance of breeding bulls for A.I. Andrological investigations for breeding soundness of bulls. Castration in different species, preparation of teaser bulls. Care, sterilization, storage and upkeep of equipments used for artificial Insemination. Preparation of A.V. Collection of semen. Evaluation of semen (Macroscopic/physical, microscopic, biochemical and biological tests). Preparation of extender and Extension of semen. Preservation techniques at different temperatures. Freezing of semen. Insemination techniques for chilled and frozen semen. Recording systems. Handling and shipment of frozen semen and liquid nitrogen containers at field level.

# DEPARTMENT OF VETERINARY SURGERY AND RADIOLOGY

## SEMESTER VII

Title of Course	:	General Veterinary Surgery, Anaesthesiology and Diagnostic Imaging
Course No.	:	VSR-411
Credit Hours	:	2+2=4

### ***I. SYLLABUS***

#### ***THEORY***

Introduction, history, classification, surgical terminology and development of veterinary surgery. Asepsis-antisepsis, their application in veterinary surgery. Surgical risk and judgement. Management of shock, haemorrhage. Principles of fluid therapy in surgical patients. Differential diagnosis and surgical treatment of abscess, tumours, cyst, Haematoma, necrosis, gangrene, burn. Wound: classification, symptoms, diagnosis and treatment; complications, their treatment and prevention.

#### ***PRACTICAL***

Surgical instruments and equipment. Operation theatre routines. Surgical pack: Preparation, sterilization and handling. Familiarization with suture materials, surgical knots, suture patterns and their use. Familiarization to live surgery haemostasis.

#### ***Anaesthesiology***

##### ***THEORY (Region Specific)***

Preanaesthetic considerations and preanaesthetics. Anaesthesia, local analgesia/ anaesthesia, general anaesthesia, anaesthetic agents (like barbiturates, Dissociative agents). Inhalation anaesthesia and agents, maintenance and monitoring of general anaesthesia. Anaesthetic emergencies and their management. Only awareness of neuroleptanalgesia, electro-anaesthesia, acupuncture, hypothermia, muscle relaxants. Post operative pain management. General principles of chemical restraint of wild/zoo animals and anaesthesia of lab animals.

#### ***PRACTICAL***

Familiarization with anaesthetic apparatus, Endotracheal tubes. Laryngoscope, gadgets for monitoring. Pre anaesthetic preparation, induction of general anaesthesia in small and large animals and Endotracheal intubation in dogs. Demonstration of inhalant anaesthesia, monitoring of general anaesthesia and the management of anaesthetic emergencies. Use of artificial/assisted respiration. Various methods of local infiltration anaesthesia and regional block for surgical procedures of different regions of body in large and small animals. Chemical restraint of lab and wild animals (visit of a wild animal facility and audiovisual aids).

#### ***Diagnostic Imaging***

##### ***THEORY***

Production and properties of X-rays. Factors influencing production of X-ray. Principles of viewing and interpreting X-ray films, classification of radiographic lesions. Contrast radiography: classification, materials, uses, indications and contra indications. Biological effects of radiation, radiation hazards and their prevention by adoption of safety measures. Principles of ultrasonography and its applications in veterinary practice. Awareness on principles of radiation therapy, isotopes and their uses in diagnosis and therapy; Principles and application of CT scan, MRI, echocardiography, scintigraphy, gamma camera, xeroradiography and Doppler.

## **PRACTICAL**

Familiarization with operation of the X-ray equipment, X-ray accessories and adoption of safety measures in radiography. Dark room equipments, X-ray film and its processing. Intensifying screen and its uses. Radiographic techniques – positioning of small and large animals. Handling, viewing and interpretation of X-ray films.

Familiarization with film contrasts, density and detail, common defects of X-ray films. Radiographic anatomy and interpretation of radiographic lesions. Demonstration of contrast technique in small animals. Familiarization with ultrasonography of small and large animals (demonstration).

## **SEMESTER VIII**

**Title of Course** : **Regional Veterinary Surgery**  
**Course No.** : **VSR-421**  
**Credit Hours** : **2+1=3**

### **I. SYLLABUS**

#### **THEORY**

##### **Head and Neck**

Affections of the lips and cheek and their treatment. Affections of the tongue and their treatment. Treatment of cleft palate. Nasal polyps. Affections and treatment of Guttural pouch, empyema, chondroids, tympanitis. Sinusitis, pus in the sinus. Affections of the horn and their treatment (avulsion of the horn, fracture of the horn, horn cancer and fissure in horn). Debudding and amputation of the horn. Affections of the teeth and their treatment: congenital abnormalities, irregular molars. (shear mouth, sharp teeth, wave form mouth, step formed mouth) dental tartar and dental caries, dental tumor and periodontal disease. Bishoping, affections of salivary glands and their treatments (trauma, sialoliths, salivary cysts, salivary fistula). Affections of upper and lower jaw and treatment. Affections of the ear and their treatment. (Haematoma and chronic otorrhoea). Eye: clinical examination of the eye. Surgical affections of the eye: entropion, ectropion, tumour of eye lid. Conjunctiva: Conjunctivitis, occlusion of nasolacrimal duct, squint. Eyeball: affections of the eye: hydrophthalmia, glaucoma, tumours of eye, panophthalmia, injuries and infections of anterior and posterior chambers. Worm in the eye. Affections of esophagus: choke, esophageal stenosis, dilation and diverticulum. Tracheal injuries and tracheal collapse. Affections of pharynx and larynx. Foreign bodies (oral cavity).

##### **Thorax and abdomen**

Fracture of rib. Perforated wounds, sternal fistula, pneumocele, traumatic pneumothorax. Hernia: classification, etiology, diagnosis and treatment, (umbilical, ventral, inguinal, perineal, diaphragmatic). Surgical affections of the stomach in dogs (cardia, pyloric stenosis, torsion). Surgical affections, diagnosis and treatment of stomach in ruminants (ruminal impaction, traumatic reticulitis, diaphragmatic hernia, abomasal displacement, omasal impaction). Surgical affections of intestines: intestinal obstruction, intussusception, strangulation (volvulus) in large and small animals. Caecal dilation, torsion. Affections of rectum: prolapse, rectal tear, anal adenitis. Congenital anomalies of colon, rectum, anus, surgical affections of liver, spleen. Surgical affections of kidney, ureters, urinary bladder. Urolithiasis and urethral stenosis their sequelae and surgical treatment. Surgical affections of penis and sheath, affections of testicle, scrotum. Surgical affections of udder and teat. Canine mammary neoplasms.

#### **PRACTICAL**

##### **Head and Neck**

Demonstration of following: Examination of oral cavity. Location of trephining of sinus in equines. Bovine: Amputation of horn, debudding. Ligation of Stenson's duct, tooth rasping/floating, otoscopy in dogs, ear haematoma, tracheotomy, tracheostomy, oesophagotomy. Ophthalmoscopy, tests for blindness, operation for ectropion, and entropion, enucleation /extirpation of the eye.

##### **Thorax and Abdomen**

Demonstration of followings: surgical approaches of the thorax and abdomen in animals with landmarks for approach to various organs. Thoracocentesis, abdominocentesis. Rumenotomy, gastrotomy, enterotomy, enteroanastomosis, urethrotomy, vasectomy, ovariohysterectomy, spaying and cytorrhaphy. Caesarean section. Amputation of tail.

## SEMESTER IX

**Title of Course** : **Veterinary Orthopaedics and Lameness**  
**Course No.** : **VSR-511**  
**Credit Hours** : **1+1=2**

### ***I. SYLLABUS***

#### ***THEORY***

Body conformation of the horse in relation to lameness (trunk, fore limb and hind limb) lameness: definition, classification and diagnosis. Shoulder slips (sweeny), bicipital bursitis, omarthritis, capped elbow, radial paralysis, carpalis, bent knee, and knock-knee. Hygroma of knee, open knee, blemished knee. Fracture of carpal bone, fracture of accessory carpal, contraction of digital flexure. Splints, sore shin, wind puffs, sesamoiditis. Osslets, ringbone, quitter, side bone, navicular disease, pyramidal diseases. Laminitis, sand crack, seedy toe, fractures of third phalanx, pedal osteitis and sole penetration. Canker, thrush and corn, Monday morning disease, cording up, myositis of psaos, iliac thrombosis, Crural paralysis, subluxation of sacroiliac joint, rupture of round ligament, trochentric bursitis. Upward luxation and fixation of patella, stringhalt, gonitis, chondromalacia of patella, rupture of tendoachilles, rupture of peroneus tertius, fibrotic myopathy and ossifying myopathy. Thoroughpin, bog spavin, spavin, curb, capped hock. Bovine lameness: contusion of sole, ulceration of sole, septic laminitis, avulsion of hoof and subluxation of patella. Interdigital fibroma, cyst, sand crack, hoof deformities. Specific joint disease (septic arthritis, osteochondritis dessicans, degenerative joint disease) in large animals and their treatment. Specific joint disease in dogs and their treatment. (intervertebral disc protrusion, spondylosis) elbow and hip dysplasia rupture of cruciate ligament. Fracture and dislocation: classification and general principles of fracture repair. Application of external and internal immobilization for different bone fractures in small and large animals. Complications of fracture healing. Affection of tendon, tendon sheath, bursa and ligaments. Principles of physiotherapy, classification, scope and limitations.

#### ***PRACTICAL***

Examination of the horse for confirmation of body (head, trunk, fore limbs and hind limbs) and diagnosis of lameness. Demonstration of equine shoeing. First aid in orthopaedic patients (splint application, Robert Jones's bandage) plaster of paris cast-application in dogs and calves. Hanging pin and trasfixtion pinning (demonstration) intra medullary pinning in dogs (demonstration). Diagnostic nerve block in equine (demonstration) demonstration of: claw trimming of bovine foot, neurological examination for evaluation of spinal trauma, tenectomies of lateral digital extensor tendon, medial patellar desmotomy, techniques and application of diathermy, electrical stimulators, ultrasonic, therapy, infra red and ultra-violet rays.

(Courses on zoo/wild animals breeding, nutrition, management and health care under VMD-512 (2+1) and pet/companion animal breeding, feeding, management and health care under VMD-513 (1+1) shall be taught jointly by departments of Veterinary Medicine, Livestock Production Management, Animal Genetic and Breeding, Animal Nutrition, Veterinary Pathology and Veterinary Surgery and Radiology).



# DEPARTMENT OF VETERINARY MEDICINE

## SEMESTER VII

Course Title	:	Veterinary Clinical Medicine – I (General & Systemic)
Course No.	:	VMD-411
Credit Hours	:	2+1 = 3

### I. SYLLABUS

#### *THEORY*

History and scope of Veterinary Medicine, Concept of animal diseases. Concepts of diagnosis, differential diagnosis and prognosis. General systemic states, hyperthermia, hypothermia, fever, septicemia, toxemia, shock and dehydration. Aetiology, clinical manifestations, diagnosis, differential diagnosis, treatment, prevention and control of the following diseases of cattle, buffalo sheep/goat, equine, pig and pet animals. Diseases of digestive system with special reference to rumen dysfunction and diseases of stomach in non-ruminants. Affections of peritoneum, liver and pancreas. Diseases of respiratory and cardiovascular systems including blood and blood forming organs. Diseases of uro-genital system & lymphatic system. Emergency medicine and critical care.

#### *PRACTICAL*

Clinical examination and diagnosis: Methods of clinical examination of individual ailing animals including history taking. Examination of animal including behaviour and general appearance: demeanour, voice, eating, drinking, defecation, urination, posture, gait, condition of skin and body coats. Inspection of body: examination of head and neck, thorax, respiratory rates, rhythm, respiratory depth, type of respiration, cardiac sounds, chest symmetry, abdomen, external genitalia, mammary glands and limbs. Physical examination: temperature taking, palpation, percussion, auscultation. Examination of ears, eyes, conjunctiva, eye balls, mouth, submaxillary and other superficial lymph nodes, jugular furrow, oesophagus, trachea. Passing of stomach tube for locating obstruction if any. Examination of specific condition of thorax: pneumothorax, haemothorax and hydrothorax. Percussion/auscultation of lung and cardiac areas. Examination of abdomen: ruminal motility, consistency, microbial population and their motility in ruminal fluid, use of trochar and canula. Examination of liver and kidneys. Liver and kidney function tests.

## SEMESTER VII

Course Title	:	Veterinary Preventive Medicine-I (Bacterial, Fungal & Rickettsial Diseases)
Course No.	:	VMD-412
Credit Hours	:	2+0=2

### I. SYLLABUS

#### *THEORY*

Clinical manifestation, diagnosis, prevention and control of infectious diseases, namely Mastitis, Haemorrhagic septicaemia, Brucellosis, Tuberculosis, Johne's disease, Black quarter, Tetanus, Listeriosis, Leptospirosis, Campylobacteriosis, Actinomycosis, Actinobacillosis, Enterotoxaemia, Glanders, Strangles, Ulcerative lymphangitis, Colibacillosis, Fowl typhoid, Pullorum disease, Fowl cholera, Avian mycoplasmosis, Spirochaetosis, Salmonellosis, Swine erysipelas. Other important bacterial diseases of regional importance (e.g. Contagious caprine pleuropneumonia, Contagious bovine pleuropneumonia, etc.) Bacterial diseases of bio-terrorism importance- Anthrax, Botulism, etc. Chlamydiosis, Q fever, Anaplasmosis. Dermatophilosis, Aspergillosis (Brooders pneumonia), Candidiasis, Histoplasmosis, Sporotrichosis, Coccidiomycosis, Mycotoxicosis, etc.

## SEMESTER VIII

Course Title	:	Veterinary Clinical Medicine – II (Metabolic & Deficiency Diseases)
Course No.	:	VMD – 421
Credit Hours	:	2+0 = 2

### I. SYLLABUS

#### THEORY

Aetiology, clinical manifestations, diagnosis, differential diagnosis, treatment, prevention and control of metabolic disorders/production diseases. Milk fever, acute parturient hypocalcaemia in goats, sows and bitches, osteodystrophy fibrosa, lactation tetany in mares, downer cow syndrome, ketosis, hypomagnesemia in cattle and buffalo, azoturia in equines, hypothyroidism and diabetes in dogs. Diagnosis and management of diseases caused by deficiency of iron, copper, cobalt, zinc manganese, selenium, calcium, phosphorus, magnesium, vitamin A, D, E, B complex, K and C in domestic animals and poultry.

Nutritional haemoglobinuria. Diseases of neonates. Diseases of skin, musculo-skeletal system, nervous system and sense organs of domestic animals. Management of common clinical poisoning. Role of alternative/integrated/ethno veterinary medicine in animal disease management.

## SEMESTER VIII

Course Title	:	Veterinary Preventive Medicine-II (Viral & Parasitic Diseases)
Course No.	:	VMD-422
Credit Hours	:	2+0=2

### I. SYLLABUS

#### THEORY

Clinical manifestation, diagnosis, prevention and control of infectious diseases, namely Foot and mouth disease, Rinderpest, Bovine viral diarrhoea, Malignant catarrhal fever, Infectious bovine rhinotracheitis, Enzootic bovine leucosis, Ephemeral fever, Blue tongue, Sheep and goat pox, PPR, Classical swine fever. Important exotic diseases for differential diagnosis- African swine fever, Swine vesicular disease, Vesicular stomatitis, Rift valley fever, Aujeszky's disease. Rabies, African horse sickness, Equine influenza, Equine infectious anaemia, Equine rhinopneumonitis, Canine distemper, Infectious canine hepatitis, Canine parvovirus disease. Highly pathogenic avian influenza, Newcastle (Ranikhet) disease, Marek's disease, Avian leucosis, Infectious bronchitis, Infectious laryngotracheitis, Avian encephalomyelitis, Fowl pox, Infectious bursal disease, Inclusion body hepatitis-hydropericardium syndrome. Other emerging and exotic viral diseases of global importance. Amphistomosis, Fasciolosis, Gastrointestinal nematodiasis, Schistosomiasis, Echinococcosis, Tapeworm infestations (cysticercosis), Verminous bronchitis, Coenurosis, Trichomonosis, Blood protozoan infections (Trypanosomiasis, Theileriosis, Babesiosis, etc.), Canine eperythrozoon infection, Coccidiosis.

## SEMESTER IX

**Course Title :** Animal Welfare, Ethics And Jurisprudence  
**Course No. :** VMD-511  
**Credit Hours :** 2+0 = 2

### **I. SYLLABUS**

#### ***THEORY***

Definition of animal welfare and ethics, Human and animal welfare in relation to ecosystem and environmental factors. Role of veterinarians in animal welfare. Animal welfare organizations. Animal Welfare Board of India- their role, functions and current status. Rules and regulations and laws on animal welfare. Prevention of cruelty to animals, (PCA) Act, 1960 (59 of 1960). Role and function of Committee for the purpose of Controlling and Supervising experiments in Animals (CPCSEA). Protection of wildlife in nature and captivity. Protection and welfare of performing animals. Welfare of animals during transportation. Animal welfare in commercial livestock farming practices. Protection and welfare of working animals. Pet and companion animal welfare. Animal welfare during natural calamities and disaster management. Legal duties of Veterinarians. Forensic and State Medicine laws. Common offences against animals and laws related to these offences. Examination of living and dead animals in criminal cases. Cruelty to animals and bestiality. Legal aspects of : Examination of animals for soundness, examination of injuries and postmortem examination. Causes of sudden death in animals. Collection and dispatch of materials for chemical examination, detection of frauds-doping, alteration of description, biotyping etc. Cattle slaughter and evidence procedure in courts. Provincial and Central Acts relating to animals. Glander and Farcy Act, 1899 (13 of 1899), Dourine Act 1910 (5 of 1910), Laws relating to the offence, affecting Public Health. Laws relating to poisons and adulteration of drugs. Livestock Importation Act. Evidence, liability and insurance. Code of conduct and Ethics for veterinarians-the regulations made under Indian Veterinary Council Act, 1984.

## SEMESTER IX

**Course Title :** Zoo/Wild Animal Breeding, Nutrition, Management And Health Care  
**Course No. :** VMD-512  
**Credit Hours :** 1+1 = 2

### **I. SYLLABUS**

#### ***THEORY***

Taxonomy of various genera of wild/zoo animals of India along with their descriptions. Ethology of wildlife species. Basic principles of habitat and housing of various classes of wild and zoo animals. Population dynamic of wild animals, effective population size of wild animals in captivity/zoo/natural habitats. Planned breeding of wild animals. Controlled breeding and assisted reproduction. Breeding for conservation of wild animals.

Feeding habits, feed and feeding schedules of zoo animals; Nutrient requirements of wild animals. Diet formulation and feeding of various age groups, sick and geriatric animals.

Restrain, capture and handling, physical examination and transport of wild and zoo animals. Principles of anesthesia, anesthetics, chemicals of restraining, common surgical interventions. Capture myopathy.

Principles of zoo hygiene, public health problems arising from zoos. Prevention, control and treatment of infectious, parasitic, nutritional and metabolic disease in zoo and wild animals. Acts and Rules related to wild and zoo animals. National and international organizations and institutions interlinked to wild and zoo animals – role and functioning.

## **PRACTICAL**

Visit of nearby sanctuary/zoo/wild animals center to study the care and management, restraint, examination, administration of medicine etc. in zoo animals. To study housing, feeds and feeding schedule of zoo animals.

To study implementation of various acts and rules related to zoo animals care and management. Postmortem examination of wild and zoo animals. Handling, processing and interpretation of pathological materials from zoo and wild animals. Attending to common surgical interventions on zoo and wild animals.

Planning for balanced feeding. Diet charts, preparation of balanced diet for new born, growing and sick animals as oral and intravenous feeds. Preparation of modified diet under selected conditions. Hygienic preparation, preservation and storage of foods.

(This course shall be taught jointly with the Departments of Veterinary Medicine Livestock Production Management, Animal Nutrition, Animal Genetics and Breeding, Veterinary Pathology, and Veterinary Surgery and Radiology)

## **SEMESTER IX**

<b>Course Title</b>	:	<b>Pet Animal Breeding, Management, Nutrition And Health Care</b>
<b>Course No.</b>	:	<b>VMD-513</b>
<b>Credit Hours</b>	:	<b>1+1 = 2</b>

### **I. SYLLABUS**

#### **THEORY**

Breeding of dogs – International pedigree breeds and those commonly seen in India.

Pedigree sheet and major breed trails. Detection of oestrus and breeding of dogs. Selecting a breed to keep, selection of a pup.

Feeding of dogs – nutritional requirements of important breeds and different age groups.

Management of dogs-kennels, care of pups and pregnant bitch. Dog shows- preparation for the shows, kennel clubs, important characters for judgement, whelping. Utility of dogs- guarding, defence, patrolling, riot control, scouting, espionage, mine detection, tracking, guiding, hunting, races, retrieving rescue and other uses. Principles of training of dogs.

Common diseases affecting dogs (bacterial, viral, parasitic, fungal, nutritional etc.), their clinical manifestations, diagnosis, treatment and control. Vaccination/ deworming schedules.

Common surgical interventions in dogs- docking, ear cropping, nail cutting, stentization. Common anesthetics and anesthesia in dogs.

Common breeds of cats, their habits, feeding, breeding and management. Common diseases of cats- their diagnosis, treatment and control. Common surgical interventions in cat.

Common pet birds seen in India. Introduction to their caging, breeding, feeding, management, disease control and prevention.

#### **PRACTICAL**

Recognizing various breeds. Handling of dogs. Types and use of leads and collars. Brushing/grooming and bathing of dogs. Restraining of dogs for examination/medication. Detections of oestrus, mating, whelping (through demonstration). Care of pups, weaning, administration of medicine. Nail and tooth care, clipping of hairs for show purposes. Hygiene of kennel/pens, feeding utensils. Visit to dog shows. Vaccination and surgical interventions (nail clipping, docking, sterilization).

Common breeds of cats, handling, restraint, examination, medication and surgical intervention in cats and kittens.

Identification of common pet birds – Handling of pet birds, their examination and administration of medicines.

(This course shall be offered jointly by the Departments of Veterinary Medicine, Livestock Production Management, Animal Nutrition, Animal Genetics and Breeding, Veterinary Pathology and Veterinary Surgery and Radiology).

# DEPARTMENT OF VETERINARY & A.H. EXTENSION

## SEMESTER V

Course Title	:	Principles And Techniques of Veterinary And Animal Husbandry Extension
Course No.	:	VAE-311
Credit Hours	:	2+1=3

### I. SYLLABUS

#### *THEORY*

Concept of Sociology. Man-animal relationship (Society, Community, Association, Institutions). Difference in livestock production practices of rural, urban and tribal communities including rearing patterns. Social change and factors of change. Social groups, its types and functions. Social transformation in relation to animal rearing.

Evolution of veterinary and animal husbandry extension in India. Extension education: definition, philosophy and principles. Concept of Community development. Teaching learning process, steps of teaching. Extension teaching methods; their classification and use. Information delivery system in Veterinary and Animal Husbandry extension. Information communication technology.

Role of animals in economy, health and socio-psychology and rural, semi urban and urban society. Client and stakeholder dealings: techniques and procedures including tools for data collection. Analysis history taking, follow-up and appraisal on prognosis. Adoption and diffusion of livestock innovations. Leadership and role of leaders in animal husbandry extension.

Farming in rural India-large and small scale farming, mixed farming, co-operative and collective farming, cooperatives: Economic principles underlying co-operative societies, co-operative milk unions in India.

Social survey and its types. Social sampling Identification of key communicators and operating through programmes. Identification of constraints in the adoption of improved animal husbandry practices.

Animal Husbandry programme planning and evaluation. Feedback evaluation of extension programmes and their impact analysis, Panchayati Raj Institutions, Krishi Vigyan Kendra (KVK), Animal Husbandry Development Programmes in Cattle, buffalo, sheep, goat, poultry, rabbit and piggery-Key village scheme, Gosadan/Goshala, Integrated Cattle Development Programme (ICDP), Integrated Rural Gender considerations in Veterinary practice. Changing expectations from new recruits to the profession and employers of veterinarians. Growing changes in corporate, client influence and changes in work ethics.

Information communication technologies. Virtual class room and self learning. E-learning. Information kiosks. Agriculture portals. E-commerce-scope and local application. Computer aided teaching/learning, web-sites dedicated to veterinary and animal sciences education, web directories and virtual learning institutions (e-institutions).

#### *PRACTICAL*

Audio-visual equipments. Principles and use of overhead, slide and multimedia projectors, digital video/still camera. Preparation and use of visual aids like posters, charts, flash cards, flipcharts, etc. Use of literature and media in Extension. Identification of key elements in social sampling of data. Collection and analysis of data. Identification of key communication elements in social sampling of data. Collection and analysis of data. Identification of key communicators and operation programme. Enumeration of organizational difficulties in animal husbandry extension programmes. Identification of constraints in the adoption of improved animal husbandry practices. Constraint analysis.

Group discussions, techniques and procedures for awareness campaigns on different veterinary and ectoparasites, pail feeding of calves, sexing and culling of birds, first aid for minor wounds, disinfection of byres, branding, use of horn cauterization of feeds and feeding schedules, deworming, preventive hygiene, vaccination etc. Organization of animal welfare camps, exhibition, livestock shows etc. Hands on training in the use of computers for teaching and information dissemination. Rapid Rural Appraisal/Participatory Rural Appraisal in identifying livestock production/health care practices.

## **SEMESTER VI**

<b>Course Title</b>	<b>:</b>	<b>Livestock Economics, Marketing And Business Management</b>
<b>Course No.</b>	<b>:</b>	<b>VAE-321</b>
<b>Credit Hours</b>	<b>:</b>	<b>2+1=3</b>

### ***I. SYLLABUS***

#### ***THEORY***

##### *Economics:*

Introduction, definition and scope (production, consumption, exchange and distribution) of economic principles as applied to livestock. Common terms-wants, goods, wealth, utility, price, value, real and money income. Important features of land, labour, capital and organization.

Livestock produce and products. Livestock contributions to national economy. Demand projections of livestock produce. Theory of consumer behavior, law of diminishing marginal utility and indifference curve analysis. Theory of demand; meaning, types of demand, demand curve and law of demand, individual and market demand, elasticities of demand and factors affecting demand, Laws and types of supply. Elasticity of supply. Cost concepts and principle of fixed and variable costs. Theory of production, law of diminishing returns, laws of returns to scale and concept of short and long run periods. Economics of animal disease and disease losses.

##### *Marketing:*

Livestock business-concepts, nature and scope. Components, characteristic of small business. Marketable livestock commodities. Concept of market, meaning and classification of markets. Market price and normal price, price determination under perfect competition in short and long run.

Marketing of livestock, and perishable and non-perishable livestock products. Merchandising-product planning and development. Marketing functions; exchange functions-buying, selling and demand creation. Physical functions-grading, transportation, storage and warehousing. Facilitative functions-standardization, risk bearing, market information and market intelligence. Market opportunities-marketing channels of livestock and livestock products, organized/unorganized markets and cattle fairs. Import and export of animal and animal products. International Agreements/Regulations (WTO and General Agreement on Trade and Tariff-GATT) for marketing/trade of live animals and products.

##### *Management:*

Resource Management-Organizational aspects of livestock farms, sources and procurement of inputs and financial resources. Break-even-analysis. Personnel (Labour) Management-Identification of work and work (job) analysis/division of labour.

##### *Accounting:*

Definition, objectives, common terms. Different systems of book keeping-single and double entry system. Various types of account books including books of original entry. Classification of accounts and rule of debit and credit. Recording of business transactions. Analysis of financial accounts-income and expenditure accounts, trading account, profit and loss accounts.

#### ***PRACTICAL***

Book keeping; general entry, writing of journal and ledger, cash book (two and three column), purchase-sale and purchase-sale return registers, trading account, profit and loss accounts, income and expenditure accounts, balance sheet, bills of exchange (bill of receivable and bill of payable), bank expenditure accounts, balance sheet, bills of exchange (bill of receivable and bill of payable), bank reconciliation statement.

Economics of a dairy unit, poultry, piggery, sheep and goat units. Visit to farms, markets and cattle fairs, backyard units and preparation of report.

## SEMESTER IX

**Course Title :** Livestock Entrepreneurship  
**Course No. :** VAE-511  
**Credit Hours :** (1+0 =1)

### ***I. SYLLABUS***

#### ***THEORY***

Livestock entrepreneurship. Avenues of entrepreneurship /employment in private and public sectors. Key concepts and theories of self employment and entrepreneurship. Essential criteria for development of entrepreneurship livestock sector – basic requirements for entrepreneurship initiatives in livestock and allied sectors (i.e. techno economic feasibility of the enterprises under different conditions, training and management skills, business acumen, business communication, inter-personnel skills for establishing enterprise.) Entrepreneurial training/development programmes at the State and National level. Animal Insurance, Bank support for entrepreneurship/financial credit and financial management-general principles and practices, analysing projects appraisals and reports, capital expenditures, decisions, reinvestment and payback. Preparing projects for bank appraisal, banking requirements. Assessing projects, profits. Procurement management, quality issues, standardization, grading and packaging. Marketing channels. Retail marketing, sales operations and management, advertising, marketing of services. Approach to preparation of entrepreneurial projects on livestock.

## TEACHING VETERINARY CLINICAL COMPLEX (TVCC)

### A. VETERINARY CLINICAL PRACTICE

VCP-411 (Semester-VII)	Credit Hour	-	0+5=5
VCP-421 (Semester-VIII)	Credit Hour	-	0+5=5
VCP-511 (Semester-IX)	Credit Hour	-	<u>0+5=5</u>
	<b>Total:</b>		<b>15</b>

The students shall be imparted the trainings on rotation basis in the following sections of Teaching Veterinary Clinical Complex (TVCC) with help of academic staff of veterinary Medicine, Veterinary Gynaecology and Obstetrics, Veterinary Surgery and Radiology and Veterinary Pathology specialization :

#### 1. Ambulatory Section:

Handling, examination, diagnosis and treatment of sick animals under field conditions under the supervision of faculty designated for Ambulatory Clinical activity. Ambulatory Clinics shall be operated by small groups of students and faculty through an equipped mobile unit in which the departments of Veterinary Medicine, Veterinary Gynaecology and Obstetrics and Veterinary Surgery and Radiology shall be involved.

#### 2. Diagnostic Laboratory Section:

The Clinical Diagnosis Laboratory will form an important component of Teaching Veterinary Clinical Complex. The Diagnostic Laboratory will impart training to groups of students for laboratory evaluation and interpretation of clinical samples leading to diagnosis/comparative diagnosis of diseases. This activity will involve training in examining clinical samples (biochemical, toxicological, pathological, parasitological and bacteriological) at the clinical complex, analyzing and correlating with clinical findings and interpreting the results.

#### 3. Medicine Section:

Orientation to Veterinary Clinics including hospital set up, administration and functioning. Methods of record keeping. Retrieval, processing, analysis and interpretation of data. Hospital management involving out patient department (OPD), Indoor patient, Critical care/intensive care unit, sanitation, up keeping, practice management etc. Doctor client interaction: Orientation to local language/dialect/ local terminology of the diseases. Registration, filling up registration cards, history taking. Relating generic and trade names of drugs along with their doses, indications and contraindications to prescribed treatment regimens. Familiarization and practice of first aid procedures and emergency medicine. Practice of collection, labeling, packaging and evaluation of laboratory samples. Clinical practice comprising of clinical examination of the patient, with emphasis on history taking, examination techniques- palpation, percussion and auscultation, systematic examination of various systems, recording of clinical observations viz. temperature, respiration, pulse, cardiac sounds, cardiac function, pulmonary function, functional motility of digestive system, routes and techniques of administration of medicaments. Diagnosis and treatment of common clinical cases like pharyngitis, laryngitis, stomatitis, indigestion, ruminal impaction, tympany, enteritis, traumaticreticulo-peritonitis, traumatic pericarditis, pneumonia, haemoglobinurea. haematuria. milk fever, ketosis, rickets, osteomalacia, common poisoning, and others. Collection of materials like urine, faeces, skin scraping, blood, milk and other body fluids for laboratory tests. Preparation of case records; follow-up records etc. Treatment of causalities and other emergencies. Screening of livestock/poultry through tests, mass diagnostic campaigns. Vaccination and other disease prevention and control programmes in the field. Practice of feeding of sick animals. Acts and regulations pertaining to generation and disposal of biomedical wastes in veterinary institutions.



Biomedical waste generation, handling, storage, sorting, coding, transportation and disposal. Hazards of biomedical waste, and impact of biomedical waste on the environment.

#### **4. Gynecology and Obstetrics Section:**

Practice of pregnancy diagnosis, examination of cases of anoestrus, silent oestrus and conception failure. Treatment of cases of metritis, cervicitis and vaginitis. Handling of case of retention of placenta. Management of Ante and post partum prolapse of vagina. Examination and preliminary handling of dystocia cases, caesarian operation Castration of male calves. Breeding soundness evaluation of bulls. Collection of cervical and vaginal mucus for cytology. Rectal examination of genitalia, vaginal examination. Familiarization with common drugs & hormones used in reproductive disorders, epidural and local anaesthesia for gynaecological cases. Filling of clinical case records and their maintenance.

#### **5. Surgery and Radiology Section:**

Familiarization with equipments used in different sections of the Hospital. Restraining and positioning of different species of animals for examinations, diagnosis and surgical treatment Prescription of common drugs, their doses and uses in clinical surgical practice. Filling of clinical case records and their maintenance. Preparation of surgical packs, sterilization procedures for surgical instruments, drapes, operation theaters. Passing of stomach tube and gastric tube. Catheterization and urine collection. Techniques of examination of neuromuscular and skeletal functions, Familiarisation with antiseptic dressing techniques, bandaging, abdomino-centesis, thoracocentesis. Topography anatomy of Cattle, Horse and Dog. Radiographic positioning and terminology. Treatment and Management of inflammation, wounds, abscess, cysts, tumors, hernia, haematoma hemorrhage, sinus, fistula, necrosis, gangrene, burn, sprain and tendinitis. First aid in fractures and dislocations and other affections of joints, facial paralysis, Eye worm & other minor affections of Eye. irregular teeth and their rasping, tail amputation, knuckling, upward fixation of patella (medical patellar desmotomy) etc. Familiarisation with the landmarks for the approach to various visceral organs, thoraco- centesis, abdominocentesis. Laparotomy, palpation and visualisation of viscera. Urethrotomy, castration, vasectomy, caudectomy, ovario-hysterectomy, thoracotomy, cystotomy, cystorraphy and splenectomy. Examination of horse for soundness and preparation of certificate for soundness. Tenotomies, suturing of tendon, shortening of tendon.

**Note:** The skills required for the Comprehensive Examination of Core Competence to be held for the purpose of assessment/evaluation of Internship shall be imparted under these courses.

## **SEMESTER VII**

### **B. VETERINARY CLINICAL BIOCHEMISTRY AND LABORATORY DIAGNOSIS – I (Jointly with VPB and VPP)**

#### **1. VLD-411 : Credit Hours 0+1 = 1**

Training in examining clinical samples (biochemical, pathological, parasitological and bacteriological). Analysing and correlating with clinical findings and interpreting the results. Collection, labeling, transportation, and preservation of body fluid samples. Writing results and report. Interpretation of data in relation to specific diseases.

Clinical significance and interpretation of serum glucose, lipids, proteins, blood urea nitrogen, creatinine, uric acid, ketone bodies, bilirubin & electrolytes from samples.

Clinical significance and interpretation of examination of urine samples.

Clinical evaluation of blood (Haemoglobin, packed cell volume, total erythrocytic count, erythrocytic sedimentation rate, total leukocytic count and differential leucocytic count) from clinical samples. Laboratory evaluation and diagnosis of samples for parasitic diseases (routine faecal examinations- direct smear method, simple sedimentation and floatation methods, Quantitative faecal examination, pastural larval counts). Examination of skin scrapings, examination of blood smear/blood for diagnosis of blood protozoan diseases.

## **SEMESTER VIII**

### **B. VETERINARY CLINICAL BIOCHEMISTRY AND LABORATORY DIAGNOSIS – II (Jointly with VPB, VPP, VMC and VPT)**

#### **2. VLD-421 : Credit Hours 0+1=1**

Evaluation of acid-base balance and interpretation. Biochemical aspects of digestive disorders, endocrine functions. Liver, kidney and pancreatic function tests. Role of enzymes for detection of tissue / organ affections.

Preparation of microscopic slides from tissue collected for diagnosis and its' histopathological interpretation. Examination of biopsy and morbid material for laboratory diagnosis, Orientation to a clinical Microbiology laboratory, Collection, transport and processing of specimens from clinical cases for diagnosis of important bacterial, fungal and viral diseases. Isolation of bacteria from clinical samples, Identification of bacteria by

Grams staining and cultural/biochemical characteristics. Drug sensitivity and rationale for therapy. Diagnosis of diseases by employing tests like Agar Gel precipitation Test Enzyme linked immunosorbent assay. Dot immunoassay, tube agglutination test, slide agglutination tests etc.

Practice for separation of toxic materials from samples. Detection of arsenic, lead, antimony, mercury, copper, zinc, fluorides. Nitrates/nitrites cyanides and tannins in body fluids/tissues of animals. Evaluation of samples of toxic residues. Appreciation and differentiation of symptoms caused by various types of toxic materials including agrochemicals plants and drugs.

## **SEMESTER VIII**

### **C. VETERINARIAN IN SOCIETY**

#### **TVC-421**

**Non-Credit Course: 1 +0=1**

Man-Animal and Society. Social - ecological interactions in animal rearing. Client oriented approach to physical examination of animals. Concepts in interaction with animal owner/clients. Bio-medical ethics and clinical evaluation. Communication skills. Animal owner information management. Human-animal bonds. Health maintenance in individual animals and population. Veterinary public health as component of society. Professional development. Societal responsibilities of veterinarians. Societal responsibilities with respect to Private and Public Hospital and practice management. Social conduct and personality profiles in management of clinical practice. Veterinary professional interactions with Health Authorities, Drug and Food Regulatory Authorities, Zoo/Animal Welfare organisations and Civil Administration. Role of Veterinarian in Natural Calamities and Disaster Management.

## **INSTRUTIONAL LIVESTOCK FARM COMPLEX**

### **SEMESTER III**

**Course Title** : **Livestock Farm Practices**  
**Course No.** : **LFP-211**  
**Credit hours** : **0+1=1**

#### ***I. SYLLABUS***

##### ***PRACTICAL***

Hands on training of the students on the overall farm practices of livestock management including cleaning, feeding, watering, grooming, milking, routine health care, record keeping, sanitation, housing, fodder production.

### **SEMESTER IV**

**Course Title** : **Livestock Farm Practices**  
**Course No.** : **LFP- 221**  
**Credit hours** : **0+1=1**

#### ***I. SYLLABUS***

##### ***PRACTICAL***

Hands on training of the students on the overall farm practices of livestock management including cleaning, feeding, watering, grooming, milking, routine health care, record keeping, sanitation, housing, fodder production.