

## FIRST PROFESSIONAL

Veterinary Anatomy	4+3=7
Veterinary Physiology	4+1=5
Veterinary Biochemistry	2+1=3
Livestock Production Management	4+2=6
	Total 14+7=21

## 21. COURSE CONTENTS

## (1) GENERAL REMARKS

Alternate use of animals as model for demonstration shall be encouraged and the computer simulations, Interactive CD-Rom, films, charts and life like models shall be used for better understanding of the subject and the programme to obtain cadavers ethically be established at all veterinary colleges.

## (2) DEPARTMENT-WISE DESCRIPTION

## (i) DEPARTMENT OF VETERINARY ANATOMY

## VETERINARY ANATOMY

Credit Hours: 4+3

Dissection will be carried out on cadavers procured by way of donation of animals or animals obtained from post-mortem section and the donated animals should be either incurable or in terminal stages and prosected specimens should be used.

**Within one year each college must setup a body donation programme or wild body programme.**

Computer simulations software's, models, mannequins, plastinated specimens, preserved body organs, models should be used for better understanding of the subject.

## THEORY

## UNIT: 1

Introduction to anatomy and branches of anatomy and descriptive terms used in anatomy and study of anatomical planes.

**General Osteology, Arthrology and Myology:** Study of properties and structure of bone. Classification of skeletons, classification of bones with suitable examples and terms used in osteology Introduction to arthrology, classification of joints, different diarthrodial joints, structure of diarthrodial joints and movements permitted. Introduction to myology, classification of muscles, etymology of muscles. Description of tendon, ligaments, aponeurosis, synovial bursa and synovial sheath.

**(Note: Detailed description of muscles of different regions of the body will be studied in the respective practical).**

**General Angiology, Neurology and Aesthesiology:** Introduction to angiology. Structure of heart. General plan of systemic and pulmonary circulations, lymphatic and venous systems. Introduction to neurology and parts of central, peripheral and autonomic nervous system and sense organs. Formation of spinal nerve. Structure of meninges, brain, spinal cord.

Different surface regions, joint regions, Palpable Bony areas or prominences of the body of the animal. Palpable Lymph nodes and Arteries of the body and Surface veins for Venepuncture. Sites for collection of Bone marrow and Cerebrospinal fluid.

**General Splanchnology:** Introduction to splanchnology, boundaries of thoracic, abdominal and pelvic cavities, topography of different organs of digestive, respiratory, urinary, endocrine, male and female reproductive systems of domestic animals and fowl.

Principles and application of Radiography and Ultrasound for bones and soft tissues.

## UNIT-2

**Fore limb:** Study of bones of fore limb of ox and differences in horse, dog, pig and fowl. Study of hoof of ox and horse. Study of joints, ligaments, stay apparatus, major blood vessels, nerves, veins and lymph nodes of fore limb. Sites for Radial, Median, Ulnar and Volar nerve blocks.

## UNIT-3

**Head and neck:** Study of cranial and facial bones, cervical vertebrae of ox and differences in horse, dog, pig and fowl. Boundaries of the oral, orbital, nasal and cranial cavities. Study of paranasal sinuses in ox, horse, dog and pig. Study of articulations and special ligaments of the head and neck. Muscles of face, mastication, eye, ear, tongue, pharynx, soft

palate, hyoid and larynx. Study of teeth, hard and soft palate, tongue, pharynx, larynx, thyroid, parathyroid and salivary glands and differences in horse, dog, pig and fowl. Study of cranial nerves, blood vessels and lymph nodes of head and neck regions. Study of boundaries of jugular furrow and structures of carotid sheath along with neck muscles. Study of sense organs, trachea and oesophagus. Age determination by Dentition. Sites for Tracheotomy, Esophagotomy, Ligation of Stensons duct and Mental, Mandibular, Maxillary, Cornual, Infraorbital, Supraorbital (frontal), Orbital and Auriculopalpebral nerve blocks and surgical approach to guttural pouches in horse. Importance of Cornual nerve and superficial Temporal artery in Amputation of Horn in cattle.

#### UNIT-4

**Thorax:** Study of thoracic vertebrae, ribs and sternum of ox and differences in horse, dog, pig and fowl. Study of joints, special ligaments, blood vessels, nerves, lymph vessels and lymph nodes of thorax. Study of organs of thorax i.e. trachea, thymus, oesophagus, lungs and differences in horse, dog, pig and fowl. Study of pleura, its reflections and mediastinum. Areas of auscultation and percussion of heart and lungs and site for Paracentesis Thoracis.

#### UNIT-5

**Abdomen:** Study of bones of abdomen of ox and differences in horse, dog, pig and fowl. Study of joints, special ligaments blood vessels, nerves of abdomen region. Blood and nerve supply to abdominal viscera. Study of peritoneal reflections, organs of digestive, urinary, male and female reproductive systems present in abdomen and differences in horse, dog, pig and fowl. Study of mammary glands in cow and differences in mare, bitch and sow. Study of spleen of ox and differences in horse, dog, pig and fowl. Study of major veins, lymph vessels, lymph nodes and endocrine glands of abdomen. Boundaries and Clinical importance of the flank and Para Lumbar Fossa. Sites for Liver, Gall Bladder and Caecal Biopsies, Laparotomy, Rumenocentesis, Rumenotomy, abomasotomy, splenectomy, Cystotomy, Caesarean Operation, enterotomy, and paravertebral block.

#### UNIT-6

**Hind limb and pelvis:** Study of bones of hind limb and pelvis of ox and differences in horse, dog, pig and fowl. Study of joints, ligaments, blood vessels, lymph nodes and nerves of hind limb, pelvis and tail region and pelvic viscera. Study of pelvic peritoneal reflections, organs of digestive, urinary, male and female reproductive systems present in pelvic cavity and differences in horse, dog, pig and fowl. Boundaries of the inguinal canal and structures of the spermatic cord, pre pubic tendon and its importance. Study of external genital organs. Sites for Tibial, Peroneal, Plantar and Pudic nerve blocks, Patellar desmotomy, Urethrotomy, Castration, Vasectomy, cranial and caudal epidural anaesthesia.

#### UNIT-7

Cytology, cell junctions, study of basic tissues i.e. epithelial, connective, muscular and nervous tissues, blood and bone marrow. Study of microscopic structures of digestive, circulatory, urinary, respiratory, nervous, lymphatic, endocrine, male and female genital systems and mammary glands of domestic animals. Study of microscopic structure of sense organs i.e. eye, ear and integument.

#### UNIT-8

Introduction to embryology, gametogenesis, fertilization, cleavage, types of eggs, morula, blastulation, gastrulation, types of implantation, twinning. Formation of foetal membranes in mammals and birds, Placenta and its classification. Different germ layers and their derivatives. Study of development of organs of digestive system including accessory structures i.e. tongue, teeth, salivary glands, liver and pancreas. Study of development of organs of respiratory, urinary, circulatory, lymphatic, nervous, musculoskeletal, male and female reproductive systems. Development of endocrine glands, sense organs i.e. eye and ear.

### PRACTICAL

#### UNIT-1

Study of general terms used in anatomy, study of anatomical planes. Study of different parts of skeleton, different surface and joint regions. Study of boundaries of thoracic, abdominal and pelvic cavities. Demonstration of different types of joints, muscles tendons, ligaments, synovial bursa and synovial sheath. In situ demonstration of heart, meninges, brain and spinal cord. Boundaries of Thoracic, Abdominal and Pelvic Cavities and in situ demonstration of organs of digestive, respiratory, urinary, endocrine, male and female reproductive systems of domestic animals.

Demonstration of Different surface regions, joint regions and Palpable Bony areas or prominences of the body of the animal, Common sites of fractures, Palpable Lymph nodes and Arteries of the body (ventral coccygeal artery in ox, femoral artery in dog and cat, facial artery in horse) and Surface veins for Venepuncture (cephalic vein and recurrent tarsal vein in dog and cat, jugular vein in large animals.) and Sites for collection of Bone marrow and Cerebrospinal fluid. Visualization of Radiographs and ultrasound pictures of various organs and Fractures of various bones.

**UNIT-2**

**Fore limb:** Demonstration of different bones of fore limb of ox and comparison with horse, dog, pig and fowl. Dissection of the fore limb. Study of joints, ligaments, muscles, major blood vessels, lymph nodes and nerves of fore limb. Study of sites for different nerve blocks or neurectomies in fore-limb. Study of suprascapular nerve paralysis-shoulder sweeney, radial nerve paralysis-capped elbow. Structure of the equine hoof and comparison with ox. Demonstration of radiographs of normal bones of fore limb. Clinical importance of cephalic vein for intravenous injections in dog.

**UNIT-3**

**Head and neck:** Demonstration of cranial and facial bones, cervical vertebrae of ox and comparison with horse, dog and fowl. Dissection of muscles of face, mastication, tongue, pharynx, soft palate, hyoid, larynx, eye and ear. Dissection of superficial neck muscles. Dissection or demonstration of tunics of eye. Study of teeth, tongue, pharynx, thyroid, parathyroid and salivary glands and differences in horse, dog, pig and fowl. Study of cranial nerves, and blood vessels of head and neck regions. Study of trachea and oesophagus. Study of nerve blocks of the head i.e. cornual, auriculo-palpebral, Peterson's orbital nerve block, mandibulo-alveolar and mental nerve blocks. Importance of facial artery for recording pulse in horse. Surgical importance of Stenson's duct in domestic animals. Surgical approach to guttural pouches-Viborg's triangle. Clinical importance of jugular vein for intravenous injections in large animals. Demonstration of radiographs of normal bones of head and neck.

**UNIT-4**

**Thorax:** Demonstration of thoracic vertebrae, ribs and sternum of ox and comparison with horse, dog, pig and fowl. Dissection of muscles, blood vessels, nerves and lymph nodes of thorax. Demonstration of organs of thorax i.e. trachea, oesophagus, thymus, lungs and heart and differences in horse, dog, pig and fowl. Study of pleural reflections of thoracic cavity. Demonstration of sites for auscultation and percussion. Recurrent laryngeal nerve paralysis-roaring in horses. Choke or oesophageal obstruction. Demonstration of radiographs and videos of ultrasonography of organs of thorax.

**UNIT-5**

**Abdomen:** Demonstration of bones forming boundaries of abdomen of ox and comparison with horse, dog, pig and fowl. Dissection of muscles, blood vessels and nerves of abdomen. Demonstration of peritoneum, omentum, mesentery and organs of digestive, urinary, male and female reproductive systems present in abdomen and differences in horse, dog, pig and fowl. Demonstration of mammary glands of cow, mare, bitch and sow. Demonstration of major veins, lymph vessels and lymph nodes of abdomen. Topographic location of abdominal viscera of ox and comparison with horse, dog, pig and fowl. Demonstration of sites for laparotomy, caesarean section, ovario-hysterectomy, catheterization of urinary bladder and sites for paravertebral and epidural anaesthesia. Demonstration of Boundaries and Clinical importance of the flank and Para Lumbar Fossa, Sites for Liver, Gall Bladder and Caecal Biopsies, Laparotomy, Rumenocentesis, Rumenotomy, abomasotomy, splenectomy Cystotomy, Caesarean Operation, catheterization of urinary bladder and enterotomy and paravertebral block. Demonstration of radiographs and videos of ultrasonography of organs of abdomen.

**UNIT-6**

**Hind limb and pelvis:** Demonstration of bones of hind limb of ox and comparison with horse, dog, pig and fowl. Demonstration of joints and ligaments of hind limb and pelvis. Dissection of muscles, blood vessels, lymph nodes and nerves of hind limb and pelvic cavity. Demonstration of peritoneal reflections of pelvic cavity and organs of digestive, urinary, male and female reproductive systems in pelvic cavity and differences in horse, dog, pig and fowl. Study of external genital organs. Clinical importance of femoral artery to record pulse in dog. Clinical importance of recurrent tarsal vein for intravenous injections in dog. Demonstration of radiographs of normal bones and videos of ultrasonography of organs of pelvis. Demonstration of Sites for Tibial, Peroneal, Plantar and Pudic nerve blocks, Patellar desmotomy, Urethrotomy, Castration, Vasectomy and cranial and caudal epidural anaesthesia.

**UNIT-7**

Microscopy and micrometry. Comparison of light and electron microscopy. Histological techniques, processing of tissues for paraffin sectioning and haematoxylin and eosin staining. Microscopic examination of epithelium, connective tissue, muscular tissue, nervous tissue and blood. Microscopic examination of organs of digestive, circulatory, urinary, respiratory, nervous, lymphatic, endocrine, male and female genital systems and sensory organs of domestic animals.

**UNIT-8**

Demonstration of Placenta, umbilical cord and foetal membranes of different domestic animals. Demonstration of congenital anomalies of domestic animals as per availability. Study of slides of developing organs of different systems as per the availability.

A embalmed cadaver of buffalo calf (procured through donated animals or cadavers obtained from post-mortem section) for every 24 students to be used for dissection purposes.

#### ANNUAL EXAMINATION

PAPERS	UNITS	MAXIMUM MARKS	WEIGHTAGE
THEORY			
Paper-I	1, 2, 3 and 4	100	20
Paper-II	5,6,7 and 8	100	20
PRACTICAL			
Paper-I	1, 2, 3 and 4	60	20
Paper-II	5,6,7 and 8	60	20

#### (ii) DEPARTMENT OF VETERINARY PHYSIOLOGY AND BIOCHEMISTRY

##### VETERINARY PHYSIOLOGY AND BIOCHEMISTRY

Credit Hours: 6+2

##### VETERINARY PHYSIOLOGY

Credit Hours: 4+1

##### VETERINARY BIOCHEMISTRY

Credit Hours: 2+1

##### VETERINARY PHYSIOLOGY

##### THEORY

##### UNIT- 1 (BLOOD, CARDIOVASCULAR, NERVOUS AND MUSCULAR SYSTEMS)

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 and transmission processes. Cardiac Cycle: Regulation of cardiac output; coronary circulation; properties of pulse; metabolism and energetic of working myocardial cell, extrinsic and intrinsic regulation; Electro Cardio Graph and its significance in Veterinary Sciences - Echocardiography. Haemorrhage haemostasis. Haemodynamics of 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.

Muscle Physiology-basic muscle unit characteristic-electrical phenomenon in muscle cell - muscle action potential, excitation and propagation of impulse characteristics- latent period refractive ness, threshold level-all and 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 and 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, electroencephalography. Sense organs and receptors physiology of special senses - Eye: functional morphology, nourishment and protection neural pathway, receptors- optics, ocular muscles and movements, photochemistry, Vision defects Ear: Physiology of hearing and common hearing impairment. Vestibule apparatus. Physiology of olfaction and taste

##### UNIT-2 (DIGESTIVE AND RESPIRATORY SYSTEMS)

Morphological characteristic of mono gastric 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 muscle exercise, high altitude hypoxia, Non-respiratory lung functions. Respiration in birds.

### **UNIT-3 ( EXCRETORY AND ENDOCRINE SYSTEMS)**

Kidney- Functional morphology of nephrons, factors determining filtration pressure, determination of glomerular filtration rate (GFR) and renal plasma flow – Re-absorption 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. Formation and excretion of urine of Birds. Cerebrospinal fluid, synovial fluids - composition, formation and flow; Joints. Regulation of bone metabolism and homeostasis.

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.

### **UNIT-4 (REPRODUCTION, LACTATION, GROWTH AND ENVIRONMENTAL PHYSIOLOGY)**

Genetic and 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 and parturition, immunology of gestation, preparturient endocrine status.

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, and metabolism, prolactin and 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 and 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 aspects of endocrine - reproductive functions, circadian rhythm.

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

## **PRACTICAL**

### **UNIT- 1 (BLOOD, CARDIOVASCULAR, NERVOUS AND MUSCULAR SYSTEMS)**

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). Simulation experiments on Nerve- Muscle and heart physiology.

### **UNIT-2 (DIGESTIVE AND RESPIRATORY SYSTEMS)**

Counting of rumen motility, estimation of volatile fatty acids and ammonia nitrogen in rumen liquor. Bacterial and protozoal count. *In-vitro* action of proteolytic enzymes- Amylase, pepsin and trypsin. Recording of respiration, spirometry. Recording of volume and capacities in different physiological states including determination of vital capacities.

**UNIT-3 ( EXCRETORY AND ENDOCRINE SYSTEMS)**

Urine analysis-physiological constituents, pathological determinates, determination of Glomerular Filtration Rate. Titerable acidity, determination of inorganic phosphorus, urine ammonia nitrogen and creatinine in urine. Recording of rumen/intestinal movements (Demonstration) and Bio assay for tropic hormone. Demonstration of hormone estimation.

**UNIT-4 (REPRODUCTION, LACTATION, GROWTH AND ENVIRONMENTAL PHYSIOLOGY)**

Oestrus and phases of oestrous cycle in animals (vaginal mucus). Behavioural signs of oestrus. 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/or video graphic/or computer simulated demonstration).

**ANNUAL EXAMINATION**

PAPERS	UNITS	MAXIMUM MARKS	WEIGHTAGE
<b>THEORY</b>			
Paper-I	1 and 2	100	20
Paper-II	3 and 4	100	20
<b>PRACTICAL</b>			
Paper-I	1 and 2	60	20
Paper-II	3 and 4	60	20

**VETERINARY BIOCHEMISTRY****Credit Hours: 2+1****THEORY****UNIT-1 (GENERAL VETERINARY BIOCHEMISTRY)**

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 and Cellobiose), Polysaccharides, (Starch, Dextrins, 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. Fat indices. Structure and functions of prostaglandins. Biochemistry of proteins: Classification, Structure, Properties - Biological significance of proteins. Amino acids: Structure and classification. Physical and chemical properties of amino acids - amphoteric nature, optical activity, and peptide bond formation. Biochemistry of nucleic acids: Chemistry of purines, pyrimidines, nucleosides and nucleotides. Biological significance of nucleosides and nucleotides. Structures and functions of deoxyribonucleic acid (DNA) and a typical ribonucleic acid (RNA).

**UNIT-2 (INTERMEDIARY METABOLISM)**

Enzymes: Definition and classification. Coenzymes, cofactors and 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 and specific activity. Enzyme inhibition: Competitive, non-competitive, uncompetitive inhibition and suicidal inhibition. Allosteric enzymes. Biological oxidation: Enzymes and coenzymes involved in oxidation and reduction. Respiratory chain or electron transport chain, oxidative phosphorylation, inhibitors, uncouplers and other factors influencing electron transport chain. Carbohydrate metabolism: Glycolysis, Krebs' cycle, HMP shunt, gluconeogenesis, Cori cycle, glycogenesis, glycogenolysis, Bioenergetics of carbohydrate metabolism. Lipid metabolism: Beta oxidation of fatty acids, ketone body formation, biosynthesis of fatty acids. Bioenergetics of lipid metabolism.

Protein metabolism: Biosynthesis and Degradation. Deamination, transamination and decarboxylation of amino acids. Ammonia transport and urea cycle. Nucleic acid metabolism: Metabolism of purines and pyrimidines. DNA and RNA biosynthesis and regulation. Regulation and Integration of metabolism.

**UNIT- 3 (VETERINARY ANALYTICAL BIOCHEMISTRY)**

Disorders of Carbohydrate Metabolism: Diabetes mellitus, Ketosis, Bovine Ketosis, Pregnancy toxemia, hypoglycaemia in baby pigs, hyperinsulinism in Dogs. Hormonal control of carbohydrate metabolism and regulation of blood sugar.

Biochemical tests for the detection of disturbance in carbohydrate metabolism. Plasma Proteins and clinical significance, Proteins and Dysproteinemias, Acute Phase proteins. Lipid Profile in disease diagnosis. Clinical Enzymology - Diagnostic importance of non-functional plasma enzymes and Isoenzymes, Liver function tests - Classification - Biochemical tests for differential diagnosis. Biochemical tests of renal function - Urine analysis - Role of BUN, Uric acid and Creatinine in diagnosis. Disturbance in acid base balance and its diagnosis. Biochemistry of digestive disorders. Biochemistry of oxidative stress and shock. Biochemical basis of fluid therapy. Detoxification in the body: Metabolism of xenobiotics, General reactions for biotransformation of different groups of substances, Cytochrome p450 system of enzymes.

## **PRACTICAL**

### **UNIT-1 (GENERAL VETERINARY BIOCHEMISTRY)**

Concentration of solutions and system International (S.I.) Units; Preparation or standardization of acids and alkalies; Preparation of Buffers; Titration curve of acid versus base; Qualitative test for carbohydrates and identification of unknown carbohydrates; Determination of acid number of an oil; Color and precipitation reactions of proteins; Estimation of amino acids (Sorensen's Method).

### **UNIT-2 (INTERMEDIARY METABOLISM)**

Effect of temperature and pH on enzyme activity; Estimation of blood or plasma Glucose, Protein, Inorganic phosphate, Calcium, Magnesium; Estimation of ascorbic acid by Dichlorophenolindophenol (DCPIP) method; Estimation of milk lactose by Benedicts quantitative method; Estimation of sodium and potassium by flame photometer; Paper or thin layer Chromatography of amino acids; Estimation of vitamin A by colorimetry.

### **UNIT-3 (VETERINARY ANALYTICAL BIOCHEMISTRY)**

Detection of Pathological Constituents in Urine; Assays of ALT and AST in Serum; Acute phase proteins (AorG Ratio); Estimation of total serum cholesterol, Blood Urea Nitrogen, creatinine, serum bilirubin (Direct, Indirect and Total).

Principles of various diagnostic tests, normal and abnormal values in different species, differential diagnosis, correlating with diseases and rationale of arriving at the conclusion need to be rediscussed in detail during Final Professional in the course VETERINARY CLINICAL PRACTICES-II, Diagnostic Laboratory Section.

#### **ANNUAL EXAMINATION**

<b>PAPERS</b>	<b>UNITS</b>	<b>MAXIMUM MARKS</b>	<b>WEIGHTAGE</b>
<b>THEORY</b>			
Paper-I	1 and 3	100	20
Paper-II	2	100	20
<b>PRACTICAL</b>			
Paper-I	1 and 3	60	20
Paper - II	21	60	20

### **(iii) DEPARTMENT OF LIVESTOCK PRODUCTION MANAGEMENT**

#### **LIVESTOCK PRODUCTION MANAGEMENT**

**Credit Hours: 4+2**

#### **THEORY**

##### **UNIT-1 (GENERAL LIVESTOCK MANAGEMENT)**

Demographic distribution of livestock and role in Indian economy. Problems and prospects of livestock industry in India. Common animal husbandry terms. (glossary) Body conformation and identification. Transportation of livestock and wild or zoo animals. Common farm management practices including disinfection, isolation, quarantine and disposal of carcass. Introduction to methods of drug administration. Common vices of animals (Cattle, Buffalo, Sheep, Goat,), their prevention and care. Livestock production systems. Animal holding and land holding patterns in different agro-climatic zones. Organic livestock production. Judging and BCS for body parts of livestock. Preparation of animals for show. Culling of animals. Selection and purchase of livestock.

**UNIT-2 (FODDER PRODUCTION AND CONSERVATION)**

Importance of grasslands and fodder in livestock production. Agronomical Practices for fodder production. Important leguminous and non-leguminous fodders in different seasons. Soil and Water conservation and drainage of water for fodder production. Fodder production for small livestock units. Structures for storage of feeds and fodders. Scarcity fodders and preservation of green fodder. Recycling of animal washings and wastes in fodders production and use of recycle waste.

**UNIT-3 (LIVESTOCK PRODUCTION MANAGEMENT-RUMINANTS)**

Housing systems, layout and design of different buildings for animals. Selection of site. General principles affecting the design and construction of building for housing for various livestock species. Arrangements of the building with special reference to Indian conditions. Utilization of local materials. Building materials used for construction of wall, roof and floor of animal houses, their characteristics, merits and demerits. Breeds of cattle and buffalo and descriptions of important breeds. Economic traits of cattle and buffaloes. General management and feeding practices of calves, heifers, pregnant, lactating and dry animals, bulls and working animals. Draught ability of cattle and buffaloes. Raising of buffalo males for meat production. Routine animal farm operations and labour management. Animal farm accounts and records. Methods of milking and precautions. Factors affecting quality and quantity of milk production. Clean milk production. Breeds of sheep and goat and their descriptions. Important economic traits for meat, milk and fibre. General management and feeding practices during different stages of growth, development and production (milk, meat and wool). Breeding schedule and management of ram and buck. Weaning and fattening of lambs and kids.

**UNIT-4 (ZOO ANIMALS PRODUCTION MANAGEMENT)**

Taxonomy of important wild zoo animals. Status and conservation practices of wild life in India. Basic principles of habitat and housing of various classes of wild zoo animals. Size and space requirement (dimension) of cubicles, enclosures of important wild zoo animals. Management of livestock in fringe areas, in and surrounding the breeding areas. Feeding habits, feeds and feeding schedules of captive animals. Restraining, capture, handling, physical examination of captive animals. Classification of zoos, management of sanctuaries, national parks etc. Acts and Rules related to captive animals. National and international organization and institutions interlinked to captive animals role and functioning.

**UNIT-5 (ANIMAL WELFARE)**

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, regulations, 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 wild life 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, Common offences against animals and laws related to these offences. Provincial and Central Acts relating to animals. Laws relating to offences affecting Public Health. Livestock Importation Act Evidence, liability and insurance. Code of Conduct and Ethics for veterinarians - the Regulations made under the Act.

**UNIT-6 (POULTRY PRODUCTION MANAGEMENT)**

Indian poultry industry – Brief outline of the different segments – poultry statistics. Classification of poultry with respect to production characters, age and standards. Production characters of other avian species. Description of indigenous fowls and their value in rural farming. Specific strains developed for rural poultry production; their acceptability and importance in rural eco-system

Brooding management – Types of brooders – preparation of shed – Importance of environmental factors. Housing – Types of poultry houses – space requirements. Recent advances in housing systems and rearing systems. Scavenging system of management – Low input technology – Backyard and semi-intensive units; their management and economic achievements. Deep litter management – control of litter-borne diseases and recycling of litter. Cage management – Different types; Advantages and disadvantages. Management of growers and layers. Management of broilers and breeders. Stress management. Feeding management–Classification of nutrients – Nutrient requirements and feed formulations. Feeding systems–Feed restrictions – phase feeding – Additives and supplements. Water management. Breeding systems and methods of mating. Selection and culling. Breeding for specific characters and for hybrid chicken production. Poultry judging. Egg structure – Physical and chemical composition. Bio-security and principles of disease prevention management. Health care for common poultry diseases – vaccination. General principles of poultry medication.

**UNIT-7 (DIVERSIFIED POULTRY PRODUCTION AND HATCHERY MANAGEMENT)**

Principles of incubation and hatchery management practices. Factors affecting fertility and hatchability, selection and care of hatching eggs and hatchery hygiene. Candling, sexing, grading, packing and disposal of hatchery waste. Economics of hatchery business – Troubleshooting hatchery failures–Computer applications in hatchery management. Poultry waste management, pollution and environmental issues. Organic and hill farming. Mixed or integrated poultry farming

Vertical & horizontal integration in commercial poultry production – Contract farming. Export or import of poultry produce and marketing. Management of ducks, geese, turkeys, Japanese quails, guinea fowls etc.

**UNIT-8 (LABORATORY OR RABBIT OR PET ANIMAL PRODUCTION MANAGEMENT)**

Importance and selection of laboratory animal, care and housing standards of mice, rats, hamster and guinea pigs. General considerations on feeding and breeding of laboratory animals. Concept of production of specific pathogen free and germ free laboratory animals. Scope of rabbit farming in the country, breeds and their distributions in India. Limitation of rabbit animal production, Selection, care and management of breeding stock for commercial purpose. Identification, care and management of kindling animals. Care of new born, growing stock. Breeding and selection techniques for optimal production of rabbit. Feeds and feeding for rabbit production. Hygienic care and Housing for rabbit production. Disposal, utilization and recycling of waste etc. Preparing projects for micro (Backyard), mini and major rabbit farms. Important breeds of dogs, cats and pet birds. Feeding of dogs, cats and pet birds. Dog show: preparation for show, kennel clubs, important characteristics for judgment. Utility of dogs- guarding, defense, patrolling, riot control, scouting, espionage, mine detection, tracking, guiding, hunting, races, retrieving rescue and other uses.

**UNIT-9 (SWINE OR EQUINE OR CAMEL, YAK AND MITHUN PRODUCTION MANAGEMENT)**

Introduction and scope of swine farming in the country. Demography of swine population. Selection and breeding techniques in swine. Important breeds (exotic and indigenous) & their characteristics. Housing and feeding of swine. 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. Equine population of India. Horses, donkeys and mules and their utility. Colors and markings. Identification of breeds of horses. Dentition and ageing of horses. Care and routine management of equines including grooming, saddling and exercise. Stable and its management. Vices of horses. Foot care and shoeing care. Feeding routine for horse, donkeys and mules. Care of stallion. Mating of horses, brood mare and its care. Foaling and care of newborn. Breeding mules. Care of race horses and preparing horses for show. Doping and its detection. Colic and its prevention. Common breeds of camel in India and their utility, peculiarities in camel. Feeding schedule of camel, rutting symptoms in camel, Vices of camel. Care of breeding in camel, pregnancy and parturition of camel. Population statistics and utility, peculiarities of yak. Feeding and breeding of Mithun or Yaks. Yak × cattle crossing, hybrids from Mithun or Yaks and their adaptation to high altitude, milk composition of Mithun or Yaks.

**PRACTICAL****UNIT-1 (GENERAL LIVESTOCK MANAGEMENT)**

General introduction of the Institute animal farm. Identification of common tools used on animal farm. Familiarization with body points of animals. Methods of identification (marking, tattooing, branding, tagging and electronic chip under pre-emptive analgesia). Use of rope for knot and halter making. Dentition and ageing of animals. Preparation of animals for show and judging. Selection and culling of animals. Preparation of project proposal

**UNIT-2 (FODDER PRODUCTION AND CONSERVATION)**

Visit to the fodder farm. Familiarization with the various types of fodders in the state and India. Familiarization with various fertilizers and manures. Collection, preservation and storage of feed and fodder; Damages or loss during transfer and storage; methods to prevent them. Cost of calculations of fodder production. Livestock waste utilization and recycling.

**UNIT-3 (LIVESTOCK PRODUCTION MANAGEMENT-RUMINANTS)**

Layout plans for different livestock houses. Visit to different animal farms and Identification of various breeds of cattle, buffalo, sheep and Goat. Humane handling and restraining of cattle, buffalo, sheep and Goat. Clipping, shearing, dipping, spraying and spotting sick animals. Determination of body weight using different measurements. Familiarization with routine cattle, buffalo, sheep and goat farm operations. Milking of dairy animals. Shearing of sheep. Training of breeding males. Detection of heat. Identification and care of pregnant animals, care of neonatal and young stock. Economics of dairy, sheep or goat farm.

**UNIT-4 (ZOO ANIMALS PRODUCTION MANAGEMENT)**

Visit to nearby wildlife sanctuary, captive animals centres to study care and management of these animals. To study housing of captive animals. To study feeds and feeding schedule of captive animals. Hygienic preparation, preservation

and storage of feeds of captive animals. Familiarization about restraining, handling and physical examination of captive animals.

#### **UNIT-5 (POULTRY PRODUCTION MANAGEMENT)**

Common breeds of poultry, different classes, Indian chickens and other avian species breeds. Digestive and respiratory system of chicken. Male and female reproductive system—Quality changes in egg during storage. Economic traits of broilers. Economic traits of egg-type chicken and breeders. AI in poultry. Housing and design of a poultry farm. Poultry farm equipment and their classification. Brooding arrangement in broiler farms. Poultry feed ingredients and its quality assessment. Poultry feed preparations. Calculation of different economic indices of broiler farm. Calculation of economic indices of layer farm. Fundamentals in poultry Post-mortem examination for sample collection. Collection and dispatch of samples for PM examination. Management during Summer, Winter and Rainy season. Automization in poultry farms (EC house).

#### **UNIT-6 (INCUBATION AND HATCHERY MANAGEMENT)**

Hatchery layout and design. Project report for establishing a broiler farm. Project report for establishing a layer farm. Project report for establishing a breeder farm. Visit to commercial poultry farms or hatchery or feed mill. Visit to farms of other avian species.

#### **UNIT-7 (LABORATORY OR RABBIT OR PET ANIMAL PRODUCTION MANAGEMENT)**

Identification of body parts and handling, weighing, sexing and weaning of laboratory animals. Marking for identification of laboratory animals for purpose of their individual recording. Computation, feeding schedule of balanced diet for high breeding efficiency of laboratory animals. Maintenance of breeding records of laboratory animals. Prophylactic measures against common disease of laboratory animals. Hygienic care and control of parasites. Shearing of rabbit. Feeding and Housing requirement and equipments for rabbit. Projects report for establishing of rabbit farm. Handling and restraining of dog, cat and pet bird and equipments for pet animals and birds. Brushing or grooming and bathing of dogs and cats. Nail and tooth care, clipping of hairs for show purpose. Care of pups, kitten and weaning.

#### **UNIT-8 (SWINE OR EQUINE OR CAMEL, YAK AND MITHUN PRODUCTION MANAGEMENT)**

Handling, restraining of swine, equines, camel. Identification of pregnant animals, care during pregnancy, isolation and care of farrowing sows and piglets. Preparation of swine, equine for show and judging, Economics of pig. Routine inspection, tooth care and vaccination schedule. Horse riding: walking, trotting, cantering and galloping. Layout plans for sty, stables

#### **ANNUAL EXAMINATION**

<b>PAPERS</b>	<b>UNITS</b>	<b>MAXIMUM MARKS</b>	<b>WEIGHTAGE</b>
<b>THEORY</b>			
Paper-I	1, 2, 3, 4 and 5	100	20
Paper-II	6,7,8 and 9	100	20
<b>PRACTICAL</b>			
Paper-I	1, 2, 3and 4	60	20
Paper - II	5,6,7 and 8	60	20