DEPARTMENT OF VETERINARY ANATOMY

1. General accommodation facilities to be provided in each department:

(1)	Chamber of HOD	200sq.ft
(2)	Office for the each teaching staff	100 sq. ft.
(3)	Office of the department	200 sq. ft.
(4)	Store	150 sq. ft.

2. The following shall be the Department-wise space requirement, namely:-

(1) VETERINARY ANATOMY

(i) Osteology and Arthrology Lab.	600 sq. ft.
(ii) Dissection hall with attached embalming room	1200 sq. ft.
(iii) Histology and Embryology Lab	600 sq. ft.
(iv) Museum	600 sq. ft.

3. The following shall be Department-wise minimum manpower requirement, namely:-

(1) VETERINARY ANATOMY

(i) Professor	1
(ii) Associate Professor	1
(iii) Assistant Professor	2

COURSE CONTENTS

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 prossected 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, Infraorabital , 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 oxand 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, spleenectomy, 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 nerves blocksorneurectomies in fore-limb. Study of suprascapular nerve paralysis- shoulder sweeny, 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 of brain and its parts. Dissectionordemonstration 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, mesentry 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, spleenectomy 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 cadevars 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, 3and 4	100	20
Paper-II	5,6,7 and 8	100	20
PRACTICAL			
Paper-I	1, 2, 3and 4	60	20
Paper-II	5,6,7 and 8	60	20

The department of Veterinary Anatomy shall have the following facilities, namely:-

1.	Almirah for bones, microscope etc.	As per need
2.	Steel or Iron racks for bones 15	15
3.	Show-cases (glass panelled) for museum	15
4.	Marble-topor S.S Top tables (with drainage)- for dissection	10
5.	Compound microscopes	30
6.	Binocular microscopes	10
7.	Autoclave	1
8	P ^{H} meter	1
9.	Hot air oven	2
10.	CCTV attachment for Microscope	1
11.	Cadaver injector	1
12.	Deep freezer - -20^{0} c - Horizontal	1
13.	Digital Analytical balance	1
14.	X- ray viewer	2
15.	Slide warmer	2
16.	Semiautomatic or Automatic rotary microtome	2
17.	Tissue floatation bath	2
18.	Histoembedder	1
19.	Refrigerator (double door)	1
20.	Drilling machine for skeleton mounting	2 sets
21.	Electric bone saw	1
22.	Animal hoisting unit with hooks etc	1
23.	Post mortem sets	2
24.	Scissors Straight	As per need
25.	Scissors Curved	As per need
26.	Hand saw	As per need

27.	Rib cutter	As per need
28.	Forceps Large	As per need
29.	Forceps small	As per need
30.	Artery forceps	As per need
31.	B. P Handles	As per need
32.	Tennaculum	As per need
33.	Plastic drums with cover	As per need
34.	Plastic buckets with cover	As per need
35.	Enamelled iron or Tissue disposable buckets	As per need
36.	Steel racks for wet specimens	As per need
37.	Enamelled trays	As per need
38.	Enamelled basins	As per need
39.	Slide box (100 slides)	As per need
40.	Slide Cabinet 2000 slides	As per need
41.	Ice box	As per need
42.	Staining jars	As per need
43.	Coupling jars	As per need
44.	S.S. Staining trays	As per need
45.	Glass- wares including museum jars	As per need
46.	Basic equipments, instruments and fluid for embalming ofethically sourced cadevar	As per need

DEPARTMENT VETERINARY PHYSIOLOGY AND BIOCHEMISTRY

1. General accommodation facilities to be provided in each department:

(i)	Chamber of HOD	200sq.ft
(ii)	Office for the each teaching staff	100 sq. ft.
(iii)	Office of the department	200 sq. ft.
(iv)	Store	150 sq. Ft

2. The following shall be the Department-wise space requirement, namely:-

VETERINARY PHYSIOLOGY AND BIOCHEMISTRY

(a) Physiology Lab	600 sq. ft.
(b) Biochemistry Lab	600 sq. ft.
(c) Analytical equipment and maintenance Laboratory	600 sq. ft.

3. The following shall be Department-wise minimum manpower requirement, namely:-

VETERINARY PHYSIOLOGY AND BIOCHEMISTRY

(d) Professor	1
(e) Associate Professor	1
(f) Assistant Professor	3

Course Content

(i) DEPARTMENT OF VETERINARY PHYSIOLOGY AND BIOCHEMISTRY

VETERINARY PHYSIOLOGY AND BIOCHEMISTRY **Credit Hours: 6+2**

VETERINARY PHYSIOLOGY Credit Hours: 4+1

VETERINARY BIOCHEMSITRY 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 andmovements, 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 balanceand H+ 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-fribrinated 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 Filteration Rate. Titerable acidity, determination of inorganic phosphorus, urine ammonia nitrogen and creatinine in urine. Recording of rumenorintestinal 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 (liveorvideo graphicorcomputer simulated demonstration).

ANNUAL EXAMINATION

PAPERS	UNITS	MAXIMUM MARKS	WEIGHTAGE
THEORY			
Paper-I	1and 2	100	20
Paper-II	3 and 4	100	20
PRACTICAL			
Paper-I	1and 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 andnucleotides. 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, Kreb's 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 acidand 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; Preparationor 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 quantative method; Estimation of sodium and potassium by flame photometer; Paper or thin later 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 billirubin (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 Profesional in the course VETERINARY CLINICAL PRACTICES-II, Diagnostic Laboratory Section.

ANNUAL EXAMINATION

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

List of Lab Equipments

The Department of Veterinary Physiology and Biochemistry shall have the following facilities,namely:-

VETERINARY PHYSIOLOGY

1.	Compound projection microscopes with LCD Screen 1	1
2.	Haemocytometer sets 20	20
3.	Haemoglobinometer sets	20
4.	Microhematocrit tubes	As per need
5.	Centrifuge 10000 RPM	2
6.	Wintrobes tubes	20
7.	Software for nerve-muscle experiments	1
8.	Sphigmomanometers (Digitalor dial typeor Mercury)	10
9.	Computerised Physiology Teaching software for various systems	1
10.	Spectro photometer	1
11.	Mono pan digital balance	5
12.	Physiograph	1
13.	Microkjeldahl set	4
14.	Digestion set	1
15.	Automatic Hematological analyser (Blood cell Counter)	1
16.	DLC Counter	5
17.	Hot air oven	1
18.	Micro Haematocrit centrifuge	1
19.	pH meter	1
20.	Viscometer	10
21.	Urinometer	10
22.	E.C.G. (Portable)	1
23.	Surface Integrator	1
24.	Stalagmometer	10
25.	Stethoscopes	10
26.	Clinical Thermometer (Digital)	10
27.	Student Microscope	10
28.	Conway diffusion disc	20
29.	Lux meter, Wind Vane, Anemometer, Rain Gauge, Maximum Minimum Thermometer, Sling psychrometer, Barometer, Cambell Stokes Sunshine recorder, Open pan Evaporimeter, Noise recorder, Dew point hygrometer	One each

VETERINARY BIOCHEMISTRY

1.	Laboratory Centrifuge 5000 rpm	2
2.	Colorimeter	1
3.	Spectrophotometer	1
4.	Flame photometer	1
5.	Electronic weighing balance	4
6.	Refrigerator	1
7.	Deep freezer (-20 C)	1
8.	Paper chromatography system	1
9.	Hot air oven	1
10.	Hot Water bath	2
11.	Hot plate to accommodate six conical flasks	1
12.	Incubator	1
13.	Micropipettes (capacity maximum 10 µl, 100 µl , 1000 µl)	1 each
14.	Fume hood	1
15.	pH meter	1
16.	Magnetic Stirrer	1
17.	Vortex Mixer	1
18.	Glassware	As per need
19.	Chemicals or Reagents	As per need
20.	Blood analyzer	1
21.	Refractometer	As per need
22.	Binocular microscope	2

LIVESTOCK PRODUCTION MANAGEMENT

1. General accommodation facilities to be provided in each department:

(1)	Chamber of HOD	200sq.ft
(2)	Office for the each teaching staff	100 sq. ft.
(3)	Office of the department	200 sq. ft.
(4)	Store	150 sq. ft.

2. The following shall be the Department-wise space requirement, namely:-

LIVESTOCK PRODUCTION MANAGEMENT

(i)	Judging Pavilion-cum Handling Room in LFC	1200 sq. ft.
(ii)	U. G. Lab-cum-Museum for breed charts and animal house Models	600 sq. ft.

3. The following shall be Department-wise minimum manpower requirement, namely:-

LIVESTOCK PRODUCTION MANAGEMENT

(a)	Professor	1
(b)	Associate Professor	1
(c)	Assistant Professor	2

COURSE CONTENT
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 andcare 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. Exportorimport 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 andparturition of

camel. Population statistics and utility, peculiarities of yak. Feeding and breeding of MithunorYaks. Yak × cattle crossing, hybrids from Mithun or Yaks and their adaptation to high altitude, milk composition of Mithun or Yaks.

PRACTCAL

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; Damagesorloss 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, sheeporgoat 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 ofrabbit. 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

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

List of Equipments

The Department of Livestock Production Management shall have the following facilities, namely:-

1.	Body brush	1
2.	Bull holder	1
3.	Bull leader	1
4.	Bull nose punch	1
5.	Bull nose ring	1
6.	Casting ropes (10-15 mt)	1
7.	Clinical thermometer	1
8.	Curry comb	1
9.	Dehorning saw	1
10.	Dipping fork	1
11.	Drenching equipment	1
12.	Drinking water gag	1
13.	Driving hammer	1
14.	Ear or neck chain	1
15.	Burdizzo castrator	1
16.	Enamel tray	1

17.	Hair clipping machine	1
18.	Halter	1
19.	Hoof rasp	1
20.	Hoof trimmer	1
21.	Measuring beakers	1
22.	Measuring tape	1
23.	Electric dehorner	1
24.	Milk measures	4
25.	Milk strainer	1
26.	Milking cans	1
27.	Milking machine	Optional
28.	Milking pails	2
29.	Muzzle prong	1
30.	Pig catcher	1
31.	Pincers	1
32.	Scissors	1
33.	Shearing machine	Optional
34.	Sprayer	1
35.	Strip cup	1
36.	Tattooing forceps	1
37.	Teat siphon	1
38.	Trocar and canula	1
39.	Drenching can or Bottle	1
40.	Probang gag	1
41.	Craddleor Leads	1
42.	Feed trolies	1
43.	Hair Clipper	1
44.	Tractor	1
45.	Feeder – chick	10
46.	Feeder – Grower	10
47.	Feeder – Layer	10
48.	Feeder – Breeder	5
49.	Drinker – Chick	10
50.	Drinker – Grower	10
51.	Drinker – Automatic	10
52.	Drinker – Nipple	10
53.	Drinker – Nipple with cup	10
54.	Automatic vaccinator	5
55.	Feeding scoop	2
56.	Individual nest box	2

57.	Community nest box	2
58.	Trap nest	1
59.	Egg filler flats – Plastic & carboard	50
60.	Egg tray	100
61.	Individual egg candler	2
62.	Brooder – Electric or Infrared or Gas or Bukhari	2
63.	Brooder guard	10
64.	Hover	5
65.	Feed grinder (Mini)	1
66.	Feed mixer (Mini)	1
67.	Incubator	1
68.	Leg bands	50
69.	Leg bands	50
70.	Models of different housing systems	1
71.	Model of environmentally controlled poultry house	1
72.	Charts of different poultry breeds	5
73.	Charts of different body parts of chicken	2
74.	Flame gun	1
75.	Vernier Calipers	10
76.	Screw gauges	10
77.	Spherometers	10
78.	Models of different types of cages	2
79.	Litter raker	5
80.	Wet and dry bulb thermometer	5
81.	Hygrometer	1
82.	Weighing balances – 100 g; 1 kg; 5 kg; 30 kg and 200 Kgs	1 each
83.	Poultry AI instruments (Semen collection cup; inseminating syringe etc.)	5

(i) VETERINARY CLINICAL COMPLEX

NOTE: This is the department where the following departments will be operating their training and services. The faculty from departments of Veterinary Medicine, Veterinary Surgery and Radiology, Veterinary Gynaecology and Obstetrics shall be on rotational duty during normal or off hours and holidays. Veterinary Microbiology, Veterinary Parasitology and Veterinary Pharmacology shall assist in the VCP. Animal Birth Control programme and anti Rabies vaccination activities shall be taken up by VCC.

(a) Reception

(i) Waiting hall for large animals.

(ii) Waiting hall for small animals.

(iii) Registration counter or record room

(iv) Dispensary, drug store etc.

(b) Animal examination section – fitted with chutes

(1) Large animals

(i) Medical unit

(ii) Surgical unit

(iii) Gynaecology unit

(2) Small animals

(i) Same as above with animal examination table

(c) Operation theatre complex:

(i) Equine surgery

(ii) Bovine surgery (standard surgery) with surgical chute (Uthrecht pattern preferable)

(iii) Canine surgery

(d) Infectious and contagious disease wards.

(i) Rabies ward

(ii) Equine isolation ward

(iii) Bovine isolation ward

(iv) Skin ward

(e) Recovery room for large animals, slings, hoist, head protectors, hobbles, twitch, linkers etc.

(f) Intensive– care unit for small animal

(g) Veterinary Diagnostic Laboratory with the facilities for Pathological, Microbiological, Parasitological and Biochemical investigation of clinical cases

(h) Indoor ward along with client or farmers rooms.

(i) Ambulatory unit (complete with diagnostic and therapeutic equipments).

(j) Animal transport facility or forklift (desirable.)

(k) Night duty section with facilities for, technicians, residents and students rooms and vehicle to transport doctors during emergencies

(l) Accommodation for staff of clinical departments and specialized services

(m) Dark room, film room, interpretation room. Computerized radiography system with accessories (optional)

(n) Physiotherapy room

(o) Loading and unloading platform

Manpower Requirement

VETERINARY CLINICAL COMPLEX

Professor with specialization in any of the clinical subjects	1
Associate Professor (Internship)*	1
Assistant Professor Clinical Pathology for Diagnostic Laboratory	1
Assistant Professor (Veterinary Biochemistry)	1
Assistant Professor (Medicine-2, Surgery-1, Gynaecology-1)	4

These teachers of Pathology, Biochemistry, Medicine, Surgery and Gynaecology should be rotated in their respective departments so that they are involved in teaching but not before two years.

Record Keeper cum Data Operator	1
Registration Assistant	1
In-charge medical store	1
Compounder or Pharmacistor VLDA	4
Laboratory Technician	1
Radiographer	1

*Internship will be the additional duty of Assoc. Prof. Internship alongwith routine clinical duty

The staff posted in VCC shall be responsible for maintaining its functionality. However, the Teaching Faculty from Surgery, Medicine and Gynaecology Departments shall also be responsible for providing all kind of services in their respective unit located in VCC on rotation. They shall also be involved during off hours and holidays as per their local needs.

List of Equipments

The Veterinary Clinical Complex shall have the following facilities, namely:-

1.Travis-Large Animal	5
2.Travis -Equine	1
3.Wheelbarrow	4
4.Drip stands	20
5.Dart gun	2
6.Hydraulic examination table-small and large animals	1+4
7.Examination tables for Small Animal	4
8.Instrument trolleys	8
9.LED projector with Computer System	1
10.Stretchers for Dogs or Cats	3
11.Movable Slings –Large Animal	2
12.Movable Slings- Small Animal	2
13.Weighing machine for small and large animals	1 each
14.Temperature controlled Room for Hyperthermic or hypothermicpatients	1
15.Stretchers for small animals	2
16.Intensive care unit (for small & Large animals)	1+1
17.Hydrolic lift	1

The Medicine Section shall have the following facilities, namely:-

1.	Stethoscopes with multiple ear piece	6 sets
2.	CMT paddles with reagents	3 sets
3.	Mouth gag- large Animal	3
4.	Mouth gag- Small Animal	2
5.	Nasogastric tubes- Horse	3
6.	Stomach tubes (For Ruminants)	3
7.	Stomach tubes (For Dogs or Cats)	3
8.	Trochar and canula	5
9.	Phonendoscopes	4
10.	Pleximeters and percussion hammers	4
11.	Electrocardiogram (Portable Model)	1
12.	Blood pressure apparatus	3 sets
13.	Opthalmoscope direct hand held	2
14.	Otoscopes	2
15.	Laryngoscopes	2
16.	Oesophagoscopes	2
17.	Tracheoscopes	2
18.	Haemodialysis unit	As per area need
19.	Refrigerator	1
20.	Stainless steel strilizer	

The Gynaecology Section shall have the following facilities,namely:-

1.	Oestrus detector	5
2.	Vaginal speculum for different species of animals	As per area need
3.	Uterine biopsy catheter	01
4.	Ultrasonography machine with rectal and abdominal probe	01
5.	LN_2 containers portable and large capacity (3L, 5L, 20L)	1 each
6.	Vaginoscope	1
7.	Obstetrical instruments	3 sets
8.	Fetotomy instrument (Thygeson's fetotome)	2 set
9.	Embryotomy knife	2
10.	Wire saw guider	2
11.	Snares (1.5 meters long)	10
12.	Long and short handle analoreye hook	2 for each
13.	Wire saw	As per need
14.	AI guns for different species	As per area need
15.	Specimen jars	30
16.	Intrauterine catheter	05
17.	Urinary catheter	05
18.	Biological incubator for neonatal calf	01
19.	Suction pump for uterine fluid	01
20.	Surgical packs for small and large animal caesarean section	5 each
21.	Hind Quarter elevator	01

The Surgery Section shall have the following facilities, namely:-

1.	Endoscopy unit	2
2.	Infusion pump	1
3.	Oxygen saturator	1
4.	Rumen Fluid Suction pump	1
5.	Shadow less OT lights	2
6.	Small animal preparation tables stainless steel top	2
7.	Dressing drums (small)	8
8.	Dressing drums (Large)	4
9.	Instrument orsyringe sterilizers	3
10.	Stainless steel tray 12" ×15" ×or15×18"	6
11.	Stainless steel tray 8" ×10"	8
12.	Scissors 8"or10" clipping	2
13.	Lamps(Shadow-less with LED light)	2
14.	Foot or Elbow soap dispenser	4
15.	Endotracheal tubes (cuffed and non-cuffed) (Small Animals)	6
16.	Endotracheal tubes (cuffed and non-cuffed) (Large Animals)	4

17.	Small animal anaesthetic machine with vaporizers	1
18.	Large animal anaesthetic machine with vaporizers	1
19.	Ambu's respirator	2
20.	Electrocardiogram battery operated or portable	1
21.	Catheters , manometers etc.	As per need
22.	Positioning pads	8
23.	Surgical pack for small animals	6
24.	Surgical pack for Large animals	8
25.	Operation tables for calves with drain	2
26.	Autoclave	2
27.	Instruments cabinets	4
28.	Orthopedic instruments complete set for pinning and plating	2
29.	Ophthalmic instruments or scopes etc.	As per area need
30.	Dental instrument for large and small animals.	One set for each
31.	Teat and udder instruments	2 set or as perneed
32.	Electro surgery unit	2
33.	Cautery sets	2
34.	Short wave or micro-wave diathermy unit with disc pad and coil electrodes	1
35.	Ultra-sonic stimulators or therapy units	1
36.	Ultrasonography machine	1
37.	Ultraviolet lamp	1
38.	Infra-red lamps	1
39.	X-ray film viewers	2
40.	Computerized radiography system with accessories	1
41.	Laryngoscope for small animals	1
42.	Laryngoscope for large animals	1
43.	Trephiner	2
44.	Weingarth's Rumenotomy set	6
45.	Muscles retractors	2
46.	Gastric clamps	2
47.	Intestinal clamps	2
48.	Hobbles set	2
49.	Different size of cannula (For large and small animal)	As per need
50.	Dog catching net	10
51.	Food and water bowl for dogs	10

The Veterinary Diagnostic Laboratory shall have the following facilities, namely:-

1.	Haemocytometers	20
2.	Haemoglobinometers	20
3.	Centrifuge (ordinary)	1
4.	Microhaematocrit centrifuge with tubes set	1
5.	Microscope (Compound-Binocular)	10
6.	Glasswares	As per need
7.	Biopsy needles	As per need
8.	Electrical conductivity meter for mastitis	2
9.	Laminar Flow	1
10.	Incubator (Normal +BOD)	1+1
11.	Deep freezer (-20^{o}C)	1
12.	Hot Air Oven	1
13.	Refrigerator	2
14.	Autoclave	2
15.	Microwave Oven	1
16.	pH meter (Digital type)	4
17.	Common Balance	2
18.	Electronic monopan Balance	1
19.	Microscope with Projector for teaching lab	1
20.	Vernier Calliper	5
21.	Neubauer slides	10
22.	Micropipettes (Assorted)	3x5
23.	Biochemical Auto analyser	1
24.	Electrolyte Analyzer	1
25.	Urine Analyzer	1
26.	Clinical haematology analyser	1
27.	Diagnostic Kits for Infectious pathogens	As per need
28.	Magnetic stirrer	1
29.	Vortex Mixer	1

(i) LIVESTOCK FARM COMPLEX

(a) This Department of Veterinary College shall provide the services of teaching in rearing of livestock species including poultry with the facilities of housing, feeding, breeding and management of large and small ruminant units, piggery, poultry and animals of regional interest; record keeping; prepration of mineral mixture and storage facilities for feed and fodder; production facilities for fodder crops; suitable accommodation for staff or students on duty.

(b) All the concerned staff on duty in this Unit shall be responsible for management including emergencies of the animals in the Livestock Farm. They shall arrange and supervise the routine managemental practices from time to time and shall maintain records for the same. They shall also be responsible for production activity in each of the units and these animals shall be utilizedas instructional farms for student teaching. Since poultry is an important component, person with Poultry Science degree or person with specialization in poultry should be appointed in LFC.

(c) LFC shall have the following farm units or land for fodder production:

A. Animal Production Management

(i) Judging Pavilion-cum- Handling Room 1200 sq. ft.

(ii) Cattle or buffalo (100)

(iii) Sheep and Goat- 50 animals each.

(iv) Piggery- 10 with one male

(v) Horse- Two (Male-one and Female-one)

(vi) Camel or regional animal (optional)

(vii) Fodder production and grassland management facility

(viii) LFC will have a group of 10 to 20 non productive animals for clinical or para clinical teaching, however, these animals shall not be used for invasive procedures.

B. Avian Production Management

(i) Poultry 1000 Layers and 1000 Broilers

(ii) Models of various systems, Pens, Cages, Runs, and Equipment.

a. Sample stock of various breeds of poultry and other avian.

b. Hatchery and chick pens.

c. Brooders.

C. Fodder Production Management

(i) Minimum 15 acres of land to meet the requirement for fodder for the LFC.

(ii) The housing should be as per Animal welfare requirements as per the Principles of 'Five Freedoms' for animal welfare.

(iii) Farm data room taking care of pedigree charts, stock books and other farm bio-data, farm account on income and other farm expenditure, balance sheets etc. shall be available as teaching material, preferably in computer terminals.

(3) Emphasis of veterinary education being on practical, instruction and demonstration must be carried out in small groups of 5-10 students; the number of teachers must be adequate for such instructions to be carried out effectively. Preferably two teachers should be involved in practical classes for better understanding.

(4) The teaching staff of the departments in a veterinary college shall be whole-time teachers.

(5) The number of staff requirement shown below is the minimum or critical in each department for imparting undergraduate teaching leading to Bachelor of Veterinary Science and Animal Husbandry degree. The departments having other activities like post-graduate teaching and other services attached, shall have at least two more faculty members of the rank of Associate Professor in each department as additional faculty members.

(6) To ensure exposure of under-graduate students to experienced teachers, it is essential to provide adequate number of senior posts (Professor or Associate Professor) in every department. No department shall function without at

least one Professor or Associate Professor.

(7) The following shall be the administration and establishment positions, namely:-

(a) Dean's Office

(b) The Dean

(c) A and AO

(d) P.A or P.S

(e) Academic Assistant

(f) Account Assistant

(g) Establishment Assistant

(h) Drivers, Messengers, Attendants, Gardeners, Sweepers, Electricians. Plumbers etc

(i) Store Purchase Unit

(8) Minimum secretarial or supporting or accounts staff should be made available to each Department or Unit in a Veterinary College as per workload and for smooth independent functioning.

(9) Radiographer for department of Surgery, Lab Technician or Audio visual technician or Artist-cum photographer or Driver or Animal Attendant-cum-Macerator or Embalmer or Lab Assistant or Lab Attendant or Animal Attendant or Attendant or Post mortem Attendant or Sweeper or Casual labour for farm practices or operations shall be as per the need and requirement of individual department.

Manpower Requirement

LIVESTOCK FARM COMPLEX (LFC)

(a)	Professor with specialization preferably in Livestock Production and Management	1
(b)	Assistant Professors (One each from Poultry production, Animal genetics and Breeding, Animal Nutrition, Livestock production and management, Veterinary medicine and Veterinary Obstetrics and Gynaecology). These teachers should be rotated in their respective departments so that they are involved in teaching but not before two years. If the herd population exceeds the prescribed minimum required additional faculty from production subjects can be recruited.	6
(c)	Assistant Farm Managers (One BVSc&AH and one Agriculture graduate for fodder production unit preferably MSc Agronomy)	2
(d)	Casual labourers	As per need
(e)	Machine Operator or Tractor Driver	As per need
(f)	VLDA	2
(g)	Assistant Farm Manager (Veterinary) will ensure the proper upkeep and maintenance of the farm and shall provide first aid and preliminary line of treatment for the cases at farm during off hours and holidays.	

List of Equipment

(43) The Livestock Farm Complex shall have the following facilities, namely:-

1.	Sprayer	1
2.	Shearing and clipping equipment	1 set
3.	Debeaking equipment	1
4.	Tattooing set tags	1
5.	A I equipment (different species)	1set each
6.	Egg Candler	1
7.	Incubator (Hatchery)	1
8.	Battery Brooder	1
9.	Trap nest	5
10.	Egg Grading Machine	1
11.	Milking Machine Set	1
12.	Chick sexing machine	1
13.	Automatic scalder	1
14.	Vernier Callipers	5
15.	Screw Gauge	5
16.	Maximum-Minimum Thermometer	2
17.	Psycho-meter	1
18.	Hair Hygrometer	1
19.	Milking cans	2
20.	Milking piles	2
21.	Milk measures	1
22.	Cream separator	1
23.	Butter churns	1
24.	Branding set	1
25.	Castrator (for different species)	1
26.	Electric clipper	1
27.	Tractor, Farm Equipment and Implement, Machinery like chaffcutter etc.	As per Need
28.	Microchip reader	1