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Academic:

SUBJECT - VETERINARY ANATOMY

THEORY

PAPER - I (UNIT I TO UNIT IV)

Sr. No.	Unit No.	Date	Topic to be covered	
UNIT - I INTRODUCTION				
1	I		**General Osteology,**	Introduction to anatomy and branches of anatomy and descriptive terms used in anatomy and study of anatomical planes. Study of properties and structure of bone. Classification of skeletons, classification of bones with suitable examples and terms used in osteology
2			**General Arthrology**	Introduction to Arthrology, classification of joints, different diarthrodial joints, structure of diarthrodial joints and movements permitted.
3			**General Myology**	Introduction to myology, classification of muscles, etymology of muscles. Description of tendon, ligaments, aponeurosis, synovial bursa and synovial sheath
4			**General Angiology**	Introduction to angiology. Structure of heart. General plan of systemic and pulmonary circulations, lymphatic and venous systems.
5			**do**	External structure of heart. Internal structure of heart.
6			**General Neurology**	Introduction to neurology and parts of central, peripheral and autonomic nervous system

7			**do**	Structure of meninges (cranial and spinal) Study of brain (dorsal and ventral aspect)
8			**do**	Study of brain (lateral aspect) Study of brain (sagittal aspect)
9			**do**	Study of spinal cord and formation of spinal nerve.
10			**General Aesthesiology**	Introduction to sense organs
11			**General Applied Anatomy**	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 nodes and Arteries of the body and Surface veins for Venepuncture. Sites for collection of Bone marrow and Cerebrospinal fluid. Principles and application of Radiography and Ultrasound for bones and soft tissues.
12			**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.
UNIT - II FORE LIMB				
13	II		**Osteology**	Regions, bones and joints of the forelimb. Scapula of ox and differences in horse, dog, pig and fowl.
14			**Osteology**	Humerus of ox and differences in horse, dog, pig and fowl.
15			**Osteology**	Radius-Ulna of ox and differences in horse, dog, pig and fowl.
16			**Osteology**	Carpals, Metacarpals, of ox and differences in horse, dog, pig and fowl.
17			**Osteology**	Phalanges & sesamoids of ox and differences in horse, dog, pig and fowl.
18			**Arthrology**	Study of joints of forelimb and ligaments
19			**Arthrology**	Study of joints of forelimb and ligaments, stay apparatus
20			**Angiology**	Branches of extra thoracic artery/ axillary artery

21			**Angiology**	Veins and lymph nodes of fore limb.
22			**Neurology**	Formation of brachial plexus and innervation to the forelimb
23			**Neurology**	Formation of brachial plexus and innervation to the forelimb
24			**Applied Anatomy**	Sites for Radial, Median, Ulnar and Volar nerve block
25			**Aesthesiology**	Structure of the equine hoof and comparison with ox.
UNIT - III HEAD AND NECK				
26	III		**Osteology**	Classification of skull bones. Boundaries of the oral, orbital, nasal and cranial cavities.
27			**Osteology**	Study of cranial bones of ox and differences in horse, dog, pig and fowl.
28			**Osteology**	Study of cranial bones of ox and differences in horse, dog, pig and fowl.
29			**Osteology**	Study of facial bones of ox and differences in horse, dog, pig and fowl.
30			**Osteology**	Study of facial bones of ox and differences in horse, dog, pig and fowl. Study of paranasal sinuses in ox, horse, dog and pig.
31			**Osteology**	Study of vertebral column. Study of cervical vertebrae of ox and differences in horse, dog, pig and fowl.
32			**Arthrology**	Study of articulations and special ligaments of the head and neck.
33			**Splanchnology**	Formation of mouth cavity. Study of teeth, hard and soft palate and tongue, of ox and differences in horse, dog, pig and fowl.
34			**Splanchnology**	Study of hard and soft palate of ox and differences in horse, dog, pig and fowl.
35			**Splanchnology**	Study of tongue, of ox and differences in horse, dog, pig and fowl.
36			**Applied Anatomy**	Age determination by Dentition.

FIRST INTERNAL ASSESSMENT ON 30% COMPLETION OF SYLLABUS MAX. MARKS 40 WEIGHTAGE 10				
37	III		**Splanchnology**	Study of pharynx and larynx with their muscles in ox and differences in horse, dog, pig and fowl.
38			**Splanchnology**	Study of thyroid and parathyroid of ox and differences in horse, dog, pig and fowl.
39			**Splanchnology**	Study of salivary glands of ox and differences in horse, dog, pig and fowl.
40			**Neurology**	Study of cranial nerves I to IV
41			**Neurology**	Study of cranial nerves V to VIII
42			**Neurology**	Study of cranial nerves IX to XII
43			**Angiology**	Blood vessels of head and neck regions.
44			**Angiology**	Lymph nodes of head and neck regions.
45			**Applied Anatomy**	Study of boundaries of jugular furrow and structures of carotid sheath along with neck muscles.
46			**Aesthesiology**	Gross anatomy of eye, eyelid and lacrimal apparatus.
47			**Aesthesiology**	Tunics of eye and refractive media of the eye.
48			**Aesthesiology**	External ear Middle and internal ear.
49			**Splanchnology**	Study of esophagus of ox and differences in horse, dog, pig and fowl and sites for Esophagotomy,
50			**Splanchnology**	Study of trachea of ox and differences in horse, dog, pig and fowl and sites for Tracheotomy,
51			**Applied Anatomy**	Sites for Ligation of Stensons duct
52			**Applied Anatomy**	Sites for Mental, Mandibular, Maxillary nerve blocks
53			**Applied Anatomy**	Sites for Cornual, Infraorbital, Supraorbital (frontal), Orbital and Auriculopalpebral nerve blocks
54			**Applied Anatomy**	surgical approach to guttural pouches in horse. Importance of Cornual nerve and superficial Temporal artery in Amputation of Horn in cattle.

UNI - IV THORAX				
55	IV		**Osteology**	Study of thoracic vertebrae and differences in horse, dog, pig and fowl.
56			**Osteology**	ribs and sternum of ox and differences in horse, dog, pig and fowl.
57			**Arthrology**	Study of joints and ligaments of the thorax
58			**Angiology**	Study of intrathoracic blood vessels (Parietal and visceral branches).
59			**Angiology**	Nerves of thorax and thoracic viscera.
60			**Angiology**	Lymph nodes of thorax and thoracic viscera.
61			**Splanchnology**	Study of pleura, its reflections and mediastinum.
62			**Splanchnology**	Study of trachea of ox and differences in horse, dog, pig and fowl.
63			**Splanchnology**	Study of esophagus of ox and differences in horse, dog, pig and fowl.
64			**Splanchnology**	Study of thymus of ox and differences in horse, dog, pig and fowl.
65			**Splanchnology**	Study of lungs of ox and differences in horse, dog, pig and fowl.
66			**Applied Anatomy**	Areas of auscultation and percussion of heart and lungs and site for Paracentesis Thoracis.
PAPER - II (UNIT V TO UNIT VIII)				
UNIT - V ABDOMEN				
67	V		**Osteology**	Study of lumbar vertebrae of ox and differences in horse, dog, pig and fowl
68			**Angiology**	Study branches of abdominal aorta (parietal and visceral).
69			**Angiology**	Study branches of abdominal aorta (parietal and visceral).
70			**Angiology**	Study of major veins, lymph vessels, lymph nodes of abdomen
71			**Neurology**	Study of nerves of abdomen.

72			**Splanchnology**	Study of peritoneum, omentum and mesentery.
73			**Splanchnology**	Study of esophagus, stomach of ox differences in horse, dog, pig and fowl
74			**Splanchnology**	Study of stomach of ox differences in horse, dog, pig and fowl
75			**Splanchnology**	Study of small intestine of ox differences in horse, dog, pig and fowl
76			**Splanchnology**	Study of part of large intestine of ox differences in horse, dog, pig and fowl
77			**Splanchnology**	Study of liver of ox differences in horse, dog, pig and fowl
78			**Splanchnology**	Study of Pancreas and spleen of ox differences in horse, dog, pig and fowl
79			**Splanchnology**	Study of Kidney and ureter of ox differences in horse, dog, pig and fowl
80			**Applied Anatomy**	Study of boundaries and Clinical importance of the flank and Para Lumbar Fossa. Sites for Liver, Gall Bladder and Caecal Biopsies,
81			**Applied Anatomy**	Laparotomy, Rumenocentesis, Rumenotomy, abomasotomy, splenectomy, Cystectomy, Caesarean Operation, Enterotomy, and paravertebral block.
SECOND INTERNAL ASSESSMENT ON 60% COMPLETION OF SYLLABUS MAX. MARKS 40 WEIGHTAGE 10				
UNIT - VI HIND LIMB AND PELVIS				
82	VI		**Osteology**	Study of Sacrum, coccygeal vertebrae. Regions, bones and joints of hind limb.
83			**Osteology**	oscoxae of ox and differences in horse, dog, pig and fowl.
84			**Osteology**	Study of femur and patella of ox and differences in horse, dog, pig and fowl.
85			**Osteology**	Study of tibia and fibula of ox and differences in horse, dog, pig and fowl.

86			**Osteology**	Study of tarsal and metatarsal of ox and differences in horse, dog, pig and fowl.
87			**Arthrology**	Study of sacro-pelvic and hip joint of ox and differences in horse, dog, pig and fowl.
88			**Arthrology**	Study of stifle and hock joint of ox and differences in horse, dog, pig and fowl.
89			**Angiology**	Study of branches of internal iliac artery.
90			**Angiology**	Study of branches of external iliac artery.
91			**Angiology**	Study of branches of external iliac artery and lymph nodes of hind limb
92			**Neurology**	Study of Formation and distribution of lumbo-sacral plexus.
93			**Neurology**	Study of nerves of pelvic viscera.
94			**Splthrology**	Study of pelvic peritoneal reflections of ox and differences in horse, dog, pig and fowl. Study of rectum and anus and differences in horse, dog, pig and fowl.
95			**Splanchnology**	Study of urinary bladder and (male and female) urethra of ox differences in horse, dog, pig and fowl.
96			**Splanchnology**	Boundaries of the inguinal canal and structures of the spermatic cord, prepubic tendon and its importance. Study of scrotum, testes, epididymis, vasdeference, penis, prepuce and accessory glands of male reproductive system.
97			**Splanchnology**	Study of ovary, oviduct, uterus and cervix, vagina, vulva and mammary glands in cow and differences in mare, bitch and sow
98			**Applied Anatomy**	Sites for Tibial , Peroneal ,Plantar and Pudic nerve blocks. Study of Patellar desmotomy, Urethrotomy, Castration , Vasectomy, cranial and caudal epidural Anaesthesia.

UNIT -VII HISTOLOGY				
99	VII		**General Histology**	Introduction to the cytology and systemic histology. Study of cell structure, organelles and inclusion bodies. functional morphology of the cell.
100			**General Histology**	Organization of primary tissues in the body and study of surface epithelial tissue.
101			**General Histology**	Study of glandular epithelium.
102			**General Histology**	Lose connective tissue including cells, fibers and ground substance.
103			**General Histology**	Cartilage, bone
104			**General Histology**	blood and bone marrow.
105			**General Histology**	Study of muscular tissue (skeletal, cardiac and smooth muscles).
106			**General Histology**	Study of Neurons and neuroglial cells.
107			**Systemic Histology**	Study of general plan of tubular organs.
108			**Systemic Histology**	Study of Oral cavity, teeth. Esophagus.
109			**Systemic Histology**	Study of Ruminant and non-ruminant stomach.
110			**Systemic Histology**	Study of Small and large intestine.
111			**Systemic Histology**	Study of Liver, gall bladder
112			**Systemic Histology**	Study of pancreas and salivary glands.
113			**Systemic Histology**	Study of Heart, blood vessels, tonsil
114			**Systemic Histology**	Study of Kidney
115			**Systemic Histology**	Study of Ureter, urinary bladder and urethra.

116			**Systemic Histology**	Study of Nostrils, nasal cavity, pharynx and larynx.
117			**Systemic Histology**	Study of Trachea and lungs.
118			**Systemic Histology**	Study of Brain, Spinal cord, ganglion
119			**Systemic Histology**	Study of Thymus, lymph node and spleen
120			**Systemic Histology**	Study of Pituitary and pineal body
121			**Systemic Histology**	Study of Thyroid, parathyroid and adrenal glands.
THIRD INTERNAL ASSESSMENT ON 90% COMPLETION OF SYLLABUS MAX. MARKS 40 WEIGHTAGE 10				
122	VII		**Systemic Histology**	Study of Ovary, oviduct, uterus
123			**Systemic Histology**	Study of cervix., Vagina, vulva and Mammary gland
124			**Systemic Histology**	Study of Vision (eye), hearing (ear), olfaction and touch
125			**Systemic Histology**	Study of Skin and its appendages, special skin structures, digital organs (hoof) and horn.
UNIT - VIII EMBRYOLOGY				
126	VIII		**General Embryology**	Introduction to embryology. Gametogenesis (spermatogenesis and oogenesis), Meiosis and gametes (Sperm and Ovum).
127			**General Embryology**	Definition, chemical basis for species specificity, fertilization - mechanism of penetration of egg membrane and reaction of egg.

128			**General Embryology**	Peculiarities of cell division in cleavage, patterns of cleavage, chemical changes during cleavage, morula, blastula and gastrulation and fate maps distribution of cytoplasmic substances in egg during cleavage.
129			**General Embryology**	Classification / types of eggs.
130			**General Embryology**	Types of implantation, twinning
131			**General Embryology**	Formation of fetal membranes in mammals and birds, Placenta and its classification
132			**General Embryology**	Different germ layers and their derivatives
133			**Systemic embryology**	Study of development of organs of nervous system.
134			**Systemic embryology**	Study of development of organs of circulatory system.
135			**Systemic embryology**	Study of development of organs of digestive system including accessory structures i.e tongue, teeth, salivary glands, liver and pancreas
136			**Systemic embryology**	Study of development of organs of respiratory,
137			**Systemic embryology**	Study of development of organs of urinary system
138			**Systemic embryology**	Study of development of organs of lymphatic and musculoskeletal system.
139			**Systemic embryology**	Study of development of organs of male reproductive and female reproductive system.
140				ANATOMY IN GENERAL

Annexure – I

Maharashtra Animal and Fishery Sciences University, Nagpur

Department of Veterinary Anatomy and Histology

M.V.Sc. Course Programme

Sr. No	Course No.	Title of the course	Credits	Compulsory/ Optional	
Semester – I					
1.	ANA 601	Comparative osteology and arthrology*	1 + 2	Compulsory	
2.	ANA 602	Comparative splanchnology*	2 + 2	Compulsory	
3.	ANA 605	Clinical anatomy	0 + 1	Optional	
4.	ANA 606	General histology and ultrastructure*	1 + 1	Compulsory	
		Total	4 + 6 = 10		
Semester – II					
1.	ANA 603	Myology, angiology, neurology and aesthesiology of Ox*	2 + 2	Compulsory	
2.	ANA 604	Gross, histological and histochemical techniques	1 + 3	Optional	
3.	ANA 607	Systemic histology and ultrastructure	3 + 1	Optional	
		Total	6 + 6 = 12		
Semester – III					
1.	ANA 608	Developmental anatomy*	2 + 1	Compulsory	
2.	ANA 609	Wild life and forensic anatomy	1 + 0	Optional	
3.	ANA 610	Master's seminar*	1 + 0	Compulsory	
			4 + 1 = 5		

		Total			
4.	ANA 611	Master's research	0 + 10		
Semester – IV					
1.	ANA 611	Master's research	0 + 20		

Minimum credit Requirement

Major courses	20
Minor courses	08
Supporting courses	06
Common courses	05
Seminar	01
Total	40

Minor & Supporting courses	Biochemistry, Physiology, Veterinary Pathology, Veterinary, Gynaecology and Obstetrics, Veterinary Surgery and Radiology,Biotechnology.

*The minor courses may be taken from any number of discipline/ department listed against major discipline limiting to credits prescribed as decided by the Chairman of Advisory Committee of the student.

Common courses

1.	Library and Information Services	0 + 1 = 1
2.	Technical Writing and Communications Skills	0 + 1 = 1
3.	Intellectual Property and its management in Agriculture	1 + 0 = 1
4.	Basic Concepts in Laboratory Techniques	0 + 1 = 1
5.	Agricultural Research, Research Ethics and Rural Development Programmes	1 + 0 = 1

Teaching lecture schedule Semester

– I : ANA – 601(1+2 =3)

Course Title: Comparative Osteology and Arthrology

Theory

Sr. No.	Particulars	No of lectures / Practicals
1.	Technical terms, structure, chemical and physical composition and classification of bones	**1**
2.	Study on scapula and humerus of oX, horse, dog, pig, sheep, goat and poultry (including clavicle and coracoid).	**1**
3.	Study on radius andulna of oX, horse, dog, pig, sheep, goat and poultry.	**1**
4.	Study on carpals of oX, horse, dog, pig, sheep, goat and poultry.	**1**
5.	Study on metacarpals and digits including sesamoids of oX, horse, dog, pig, sheep, goat and poultry.	**1**
6.	Comparative study on os-coXae including pelvimetry and femur of oX, horse, dog, pig, sheep, goat and poultry.	**1**
7.	Comparative study on tibia and fibula of oX, horse, dog, pig, sheep, goat and poultry.	**1**
8.	Comparative study on tarsal and metatarsal of oX, horse, dog, pig, sheep, goat and poultry.	**1**
9.	Study on the ethmoid, occipital and sphenoid bone of oX, horse, dog, pig, sheep, goat and poultry.	**1**
10.	Study on the frontal, parietal, interparietal and temporal bones of oX, horse, dog, pig, sheep, goat and poultry.	**1**
11.	Study on the maXilla, premaXilla, palatine, pterygoid, nasal, lacrimal and malar bones of oX, horse, dog, pig, sheep, goat and poultry.	**1**
12.	Study on vomer, hyoid and mandible bones of oX, horse, dog, pig, sheep, goat and poultry	**1**
13.	Study on cervical, thoracic, lumbar, sacral and coccygeal vertebrae of oX, horse, dog, pig, sheep, goat and poultry	**1**
14.	Study on ribs and sternum of oX, horse, dog, pig, sheep, goat and poultry.	**1**
15.	Detailed study of different joints of the body	**2**
16.	Biomechanics of the locomotor system	**1**
17.	Radiographic anatomy	**1**
	Total	**18**

Teaching lecture schedule Semester

– I : ANA – 601(1+2 =3)

Course Title: Comparative Osteology and Arthrology

Practical

Sr. No.	Particulars	No of lectures / Practicals
1.	Topographic terms.	**1**
2.	Classification of bones	**1**
3-4.	Comparative study on scapula and humerus	**2**
5-6.	Comparative study on radius and ulna	**2**
7-8.	Comparative study on carpals	**2**
9-10.	Comparative study on metacarpals and digits	**2**
11.	Comparative study on os-coXae and femur	**1**
12-13.	Comparative study on tibia and fibula	**2**
14.	Comparative study on tarsal and metatarsal	**2**
15-16	Comparative study on the ethmoid, occipital and sphenoid bone	**3**
17-18.	Comparative study on the frontal, parietal, interparietal and temporal bones	**2**
19-20.	Comparative study on the maXilla, premaXilla, palatine pterygoid,nasal, lacrimal and malar bones	**2**
21-22.	Comparative study on vomer, hyoid and mandible bones	**2**
23-24.	Comparative study on cervical and thoracic vertebrae	**2**
25-27.	Comparative study on bones of lumbar, sacral and coccygeal vertebrae.	**2**
28-30.	Comparative study on ribs and sternum	**2**
31-32.	Classification and detailed study of different joints of the body.	**2**
33-34.	Biomechanics of the locomotor system	**2**
35-36.	Radiographic anatomy	**2**
	Total	**36**

Teaching lecture schedule Semester

– I : ANA – 602 (2+2 =4)

Course Title: Comparative Splanchnology

Theory

Sr. No.	Particulars	No of lectures / Practicals
1.	Introduction	**1**
2.	Study of topographic anatomy and reflection of thoracic, abdominal and pelvic cavities in ox, horse, dog, pig, sheep, goat and poultry	**2**
3.	Comparative anatomy of oral cavity in ox, horse, dog, sheep, goat and pig.	**2**
4.	Comparative anatomy of dentition in ox, horse, dog, sheep, goat and pig,	**1**
5.	Comparative anatomy of tongue in ox, horse, dog, sheep, goat and pig.	**1**
6.	Comparative anatomy of esophagus in different species	**1**
7.	Study of the salivary glands of various species	**1**
8.	Study of ruminant stomach along with omentum	**2**
9.	Study of monogastric stomach and omentum of various species	**2**
10.	Comparative anatomy of small intestines of various species	**1**
11.	Comparative anatomy of large intestines of various species	**1**
12.	Study of liver and gall bladder of various species	**1**
13.	Study of spleen and pancreas of various species	**1**
14.	Study of digestive system of poultry	**1**
15-16.	Study of nasal cavity in ox, horse, dog, sheep, goat and pig	**2**
17.	Study of larynx of various species	**1**
18.	Study of trachea of various species	**1**
19.	Comparative anatomy of lungs of various species	**2**
20.	Study of digestive system of fowl	**1**
21.	Study of kidneys of various species	**1**
22.	Study of ureter and urinary bladder	**1**
23.	Study of urethra	**1**
24.	Study of male genital system and associated organs of various species	**1**

25.	Study of female genital system and associated organs of various species	**2**
26.	Study of male and female genital system of fowl	**1**
27.	Study of udder of different species of animals	**1**
28.	Study of body cavities	**2**
	Total	**36**

Teaching lecture schedule Semester

– I : ANA – 602 (2+2 =4)

Course Title: Comparative Splanchnology

Practical

Sr. No.	Particulars	No of lectures / Practicals
1.	Introduction	**1**
2.	Study of topographic anatomy of thoracic, abdominal and pelvic cavities in different animals.	**2**
3.	Comparative anatomy of oral cavity in ox, horse, dog, sheep, goat and pig.	**2**
4.	Comparative anatomy of dentition in ox, horse, dog, sheep, goat and pig,	**1**
5.	Comparative anatomy of tongue in ox, horse, dog, sheep, goat and pig.	**2**
6.	Comparative anatomy of esophagus in different species	**1**
7.	Study of the salivary glands of various species.	**2**
8.	Study of ruminant stomach along with omentum	**2**
9.	Study of monogastric stomach and omentum of various species	**2**
10.	Comparative anatomy of small and large intestines and anus of various species	**2**
11.	Study of liver and gall bladder, spleen, pancreas of various species	**2**
12.	Study of larynx of various species	**1**
13.	Comparative anatomy of lungs of various species	**2**
14.	Study of body cavities	**2**
15-16	Study of urinary system and associated organs of various species	**2**
17.	Study of male genital system and associated organs of various species	**2**
18.	Comparative study of accessory sex glands in different species	**2**
19.	Study of female genital system and associated organs of various species	**2**
20.	Study of endocrine organs of various species	**2**
21.	Study of udder of different species of animals	**2**
	Total	**36**

Teaching lecture schedule

Semester – II : ANA – 603 (2+2 =4)

Course Title: Myology, Angiology, Neurology and Aesthesiology of Ox

Theory

Sr. No.	Particulars	No of lectures / Practicals
1.	Myology and organization of various types of muscles	**2**
2.	Heart and pericardium	**4**
3.	Muscles and blood supply to the head and neck	**3**
4.	Muscles and blood supply to the forelimb	**3**
5.	Muscles of thoraX and abdomen and thoracic aorta, abdominal aorta and its branches	**2**
6.	Muscles and blood supply to the hind limb	**2**
7.	Venous system	**2**
8.	Lymph glands and its afferent and efferent vessels	**2**
9.	Study of brain	**2**
10.	Study of cranial nerves	**2**
11.	Study of spinal cord and spinal nerves	**2**
12.	Brachial and lumbo-sacral plexus	**2**
14.	Structure of eye ball	**2**
15.	Structure of eXternal, middle and internal ear of different species	**2**
16.	Study of hoof	**2**
17.	Study of horn	**2**
	Total	**36**

Teaching lecture schedule

Semester – II : ANA – 603 (2+2 =4)

Course Title: Myology, Angiology, Neurology and Aesthesiology of Ox

Practical

Sr. No.	Particulars	No of lectures / Practicals
1.	Introduction to general mycology	1
2.	Structure of heart	2
3.	Brachiocephalic trunk, course of aorta, coronary arteries and pulmonary trunk	1
4.	Bicarotid trunk	1
5.	Blood supply to the forelimb	1
6.	Thoracic aorta and its branches abdominal aorta	1
7.	Abdominal aorta and its branches	1
8.	Blood supply to the hind limb	1
9.	Meninges	1
10.	Dorsal and ventral aspect of brain and ventricles of brain, sagittal sections of brain of different species	1
11.	Cranial nerves,	1
12.	Spinal cord and spinal nerves	1
13.	Brachial plexus	1
14.	Lumbo-sacral plexus	1
15.	Venous drainage and lymphatic system	1
16.	Blood supply to the brain	2
17.	Study of eye	1
18.	Study of ear	1
19.	Autonomic nervous system	1
20	Muscle of face, larynx, mastication, soft palate, tongue, pharynx and ear	4
21.	Muscles of neck	2

22.	Muscles of fore limb	**2**
23	Muscles of fore limb	**1**

24.	Muscles of, abdomen	**2**
25	Muscles of hip and thigh	**2**
26.	EXtensors and fleXors of hind limb	**2**
27.	Muscles of tail and penis	**1**
	Total	**36**

Teaching lecture schedule

Semester – II : ANA – 604 (1+3 =4)

Course Title: Gross, Histological and Histochemical Techniques Theory

Sr. No.	Particulars	No of lectures / Practicals
1.	Embalming fluid and its preparation	**1**
2.	Embalming techniques, formalin and modified gravity feed embalming technique.	**1**
3.	Maceration and preparation of skeletons; taXidermy, burial method, specimens different species; Tompsett 1955, Mulligam 1931 for gray matter, Waldman and Michaels (1954) for white matter, Hewitt method	**1**
4.	Demonstration of sites of ossifications alizarin red technique	**1**
5.	Preparation of transparent specimens of various organs, plastination	**1**
6.	Preparation of transparent specimens of various organs, plastination	**1**
7.	Chemical composition of a living cell	**1**
8.	FiXation of tissue samples with different fiXatives and post fixation of tissue samples	**1**
9.	Embedding, block preparation and paraffin sectioning.	**1**
10.	Natural and synthetic dyes	**1**
11.	Metachromasia and supravital staining	**1**
12.	Routine hematoXylin and eosin staining	**1**
14.	Special staining for connective, muscular and nervous tissue.	**1**
15.	Special stain for demonstration of nucleic acids	**1**
16.	Special staining for cytoplasmic granules and pigments and minerals	**1**
17.	Differential staining for cell types	**1**
18.	Demonstration of silver staining techniques	**1**
	Total	**18**

Teaching lecture schedule

Semester – II : ANA – 604 (1+3 =4)

Course Title: Gross, Histological and Histochemical Techniques Practical

Sr. No.	Particulars	No of lectures / Practicals
1.	Embalming fluid and its preparation	**2**
2.	Embalming techniques, formalin and modified gravity feed embalming technique.	**2**
3.	Maceration and preparation of skeletons; taXidermy, burial method, chemical method(sodium hydroXide method) gross staining of brain specimens different species; Tompsett 1955, Mulligam 1931 for gray matter, Waldman and Michaels (1954) for white matter, Hewitt method	**2**
4.	Demonstration of sites of ossifications alizarin red technique	**2**
5.	Preparation of transparent specimens of various organs, plastination	**2**
6.	Preparation of casts of various organs, vinyl acetate cast	**2**
7.	Chemical composition of a living cell	**2**
8.	FiXation of tissue samples with different fiXatives	**4**
9.	Post fiXation of tissue samples	**2**
10.	Embedding, block preparation and paraffin sectioning.	**4**
11.	Natural and synthetic dyes	**2**
12.	Metachromasia and supravital staining	**2**
13.	Routine hematoXylin and eosin staining	**2**
14.	Special staining for connective: elastic, reticular and collagen fibres, muscular and nervous tissue.	**4**
15.	Staining for carbohydrates: pas, amp and proteins.	**3**
16.	Special stain for demonstration of nucleic acids, lipids and enzymes	**3**
17.	Special staining for cytoplasmic granules	**3**
18.	Special staining for pigments and minerals	**3**
19.	Differential staining for cell types	**3**
20.	Demonstration of silver staining techniques	**3**
	Total	**54**

Teaching lecture schedule

Semester – I : ANA – 605 (0+1 =1)

Course Title: Clinical Anatomy Practical

Sr. No.	Particulars	No of lectures / Practicals
1.	Clinical examination of animal by palpation, percussion and auscultation	**1**
2.	Site to record temperature, pulse, palpable lymph nodes, collection of blood and pregnancy diagnosis in domestic animals	**1**
3.	Area of auscultation for lungs and heart, passing of probang	**1**
4.	Preferable site for injections in domestic animals (intradermal, subcutaneous, intramuscular, intravenous, intracardiac, intratracheal, subconjunctival, intra-articular, epidural)	**1**
5.	Nerve blocks of head region (frontal, infraorbital, mandibulo- alveolar, mental, retrobulbar, Peterson, auriculopalpebral and cornual) for different surgical conditions (extraction of tooth, trephining of frontal and maxillary sinuses, extirpation of eye ball, amputation of horn, haematoma)	**2**
6.	Surgical conditions of respiratory system (catheterization of guttural pouch, ventriculectomy in horse, tracheotomy, thoracocentesis)	**1**
7.	Paravertebral nerve block, paracentesis, rumenocentesis. Surgical conditions of digestive system (passing of stomach tube, ligation of parotid duct, oesophagotomy, abdominocentesis, rumenotomy, laparotomy/ celiotomy, gastrotomy, splenectomy, enterotomy, extirpation of anal sacs in dog)	**2**
8.	Surgical conditions of urinary system (urethrotomy, puncturing of urinary bladder, catheterization of urinary bladder, cystotomy)	**1**
9.	Surgical conditions of genital system (hysterotomy/ caesarean section, ovario-hysterectomy (spaying), castration, vasectomy, caponing in fowl)	**1**
10.	Nerve blocks of fore limb (radial, median, ulnar, volar digital nerves) for surgical affections	**1**
11.	Nerve blocks of hind limb (tibial, peroneal, saphenous, plantar digital nerves) for surgical affections including patellar desmotomy	**1**
12.	Nerve blocks (pudic, cranial epidural, caudal epidural) for surgical affections including docking	**2**
13.	Radiographical techniques, contrast radiography	**1**
14.	Radiographic visualization of organs of thoracic and abdominal cavity	**1**
15.	Radiographic visualization of organs of pelvic cavity	**1**
16.	Post-mortem examination and collection of material for teaching and research	**2**
	Total	**18**

Teaching lecture schedule Semester
– I : ANA – 606 (1+1 =2)

Course Title: General Histology and Ultrastructure Theory

Sr. No.	Particulars	No of lectures / Practicals
1.	Introduction to animal cell and Study of plasma membrane	**1**
2.	Study of nucleus and nuclear membrane and Study of mitochondria and endoplasmic reticulum	**1**
3.	Study of Golgi apparatus, centriole, lysosomes, microtubules, microfilaments, etc.	**1**
4.	Cell division and Cell wall modifications and junctional complexes	**1**
5.	Light and ultrastructural study of different types of epithelial tissue and glands	**2**
6.	Light and ultrastructural study of different types of muscular tissue	**1**
7.	Introduction to different types of connective tissue and Detailed study of connective tissue fibres; collagen, reticular and elastic	**1**
8.	Study of different cell types of connective tissue, constituents of ground substance	**1**
9.	Study of different types of connective tissues	**1**
10.	Light and ultrastructural details of different cartilages; hyaline, elastic and fibrous cartilage	**3**
11.	Light and ultrastructural details of bone	**1**
12.	Structural details of blood and its different constituents	**2**
13.	Light and ultrastructural study of neurons and neuroglial cells of CNS and PNS, nerves, ganglion, etc.	**3**
	Total	**18**

Teaching lecture schedule Semester
– I : ANA – 606 (1+1 =2)

Course Title: General Histology and Ultrastructure

Practical

Sr. No.	Particulars	No of lectures / Practicals
1.	Study on electron micrographs of an animal cell to distinguish different organelles	**1**
2.	Study of electron micrographs of plasma membrane, nucleus and nuclear membrane	**2**
3.	Study of electron micrographs of mitochondria, Golgi apparatus and endoplasmic reticulum	**1**
4.	Study of different types of epithelial tissues by light microscope	**1**
5.	Study of different types of epithelial tissues and glands by electron micrographs	**1**
6.	Study of different types of Muscle tissues by light microscope	**1**
7.	Study of different types of Muscle tissues by electron micrographs	**1**
8.	Study of different types of connective tissue fibres and cells	**2**
9.	Study of different types of connective tissues	**3**
10.	Study of different types of cartilages	**1**
11.	Study of Bone; ground bone and decalcified bone	**1**
12.	Study of different constituents of blood	**1**
13.	Study of different constituents of blood	**2**
	Total	**18**

Teaching Lecture Schedule Semester
– II : ANA – 607 (3+1 =4)

Course Title : Systemic Histology and Ultrastructure

Theory

Sr. No.	Particulars	No of lectures / Practicals
1.	General organization of the wall of tubular organs	2
2.	Light microscopic and ultra structural study of tongue, lip and cheek	**2**
3.	Light microscopic and ultra structural study of salivary gland	**2**
4.	Light microscopic and ultra structural study of pharynx and Oesophagus	**2**
5.	Light microscopic and ultra structural study of rumen, reticulum and Omasum	**2**
6.	Light microscopic and ultra structural study of abomasum	**2**
7.	Light microscopic and ultra structural study of small intestine	**2**
8.	Light microscopic and ultra structural study of large intestine	**2**
9.	Light microscopic and ultra structural study of liver	**2**
10.	Light microscopic and ultra structural study of pancreas and gall bladder	**2**
11.	Light microscopic and ultra structural study of nasal cavity	**2**
12.	Light microscopic and ultra structural study of larynx and trachea	**2**
14.	Light microscopic and ultra structural study of lungs	**2**
15.	Light microscopic and ultra structural study of cardiovascular system including heart	**2**
16.	Light microscopic and ultra structural study of lymphoid organs	**2**
17.	Light microscopic and ultra structural study of ovary	**2**
18.	Light microscopic and ultra structural study of oviduct and uterus	**2**
19.	Light microscopic and ultra structural study of cervix, vagina and mammary glands	**2**
20.	Light microscopic and ultra structural study of testes	**2**
21.	Light microscopic and ultra structural study of epididymis and vas deferens	**2**
21.	Light microscopic and ultra structural study of urethra and accessory sex glands and penis	**3**
	Total	**54**

Teaching Lecture Schedule Semester
– II : ANA – 607 (3+1 =4)

Course Title : Systemic Histology and Ultrastructure

Practical

Sr. No.	Particulars	No of lectures / Practicals
1.	Light microscopic and ultra structural study of lip and cheek, tongue and salivary glands	**1**
2.	Light microscopic and ultra structural study of pharynx and oesophagus	**1**
3.	Light microscopic and ultra structural study of rumen, reticulum, Omasum and abomasum	**1**
4.	Light microscopic and ultra structural study of small intestine	**1**
5.	Light microscopic and ultra structural study of large intestine	**1**
6.	Light microscopic and ultra structural study of liver, pancreas and gall bladder	**1**
7.	Light microscopic and ultra structural study of larynx and trachea	**1**
8.	Light microscopic and ultra structural study of lungs	**1**
9.	Light microscopic and ultra structural study of cardiovascular system including heart	**1**
10.	Light microscopic and ultra structural study of lymphoid organs	**1**
11.	Light microscopic and ultra structural study of ovary and oviduct	**1**
12.	Light microscopic and ultra structural study of uterus, cervix, vagina and mammary glands	**1**
13.	Light microscopic and ultra structural study of male reproductive system	**1**
14.	Light microscopic and ultra structural study of kidney, ureter, urinary bladder and Urethra	**1**
15.	Light microscopic and ultra structural study of endocrine glands; thyroid, pituitary, adrenal gland, parathyroid, pineal gland	**1**
16.	Light and ultrastructural study of Spinal cord, cerebrum and cerebrum	**1**
17.	Light microscopic and ultra structural study of sense organs	**2**
	Total	**18**

Teaching Lecture Schedule Semester
– III : ANA – 608 (2+1 =3)

Course Title : Developmental Anatomy

Theory

Sr. No.	Particulars	No of lectures / Practicals
1.	Introduction to Embryology, history of embryology, term used in embryology Gametogenesis; Spermatogenesis	**3**
2.	Oogenesis; classification of eggs, structure of mammalian and avian eggs	**3**
3.	Fertilization, Cleavage Implantation Placentation	**3**
4.	Blastulation Gastrulation, formation of extra embryonic membranes	**3**
5.	Formation of extra embryonic membranes	**2**
6.	Organogenesis and histogenesis of nervous system,	**2**
7.	Development of sense organs	**2**
8.	Development of endocrine organs	**2**
9.	Cardiovascular system including fetal circulation.	**2**
10.	Embryonic development of gastro-intestinal tract	**2**
11.	Development of liver, pancreas and gall bladder	**2**
12.	Development of Respiratory system	**2**
13.	Development of urinary system	**2**
14.	Male reproductive system	**2**
15.	Female reproductive system	**2**
16.	Musculoskeletal system	**2**
	Total	**36**

Teaching Lecture Schedule Semester
– III : ANA – 608 (2+1 =3)

Course Title : Developmental Anatomy Practical

Sr. No.	Particulars	No of lectures / Practicals
1.	Study of sperm and ova	**1**
2.	Cleavage, Blastulation and Gastrulation	**2**
3.	Study of whole mount sections of chick embryo and serial sections of chick embryo	**2**
4.	Organogenesis, Development of nervous system	**1**
5.	Organogenesis, Development of digestive system	**2**
6.	Organogenesis, Development of digestive system	**2**
7.	Organogenesis, Development of cardiovascular system	**2**
8.	Organogenesis, Development of endocrine system	**1**
9.	Organogenesis, Development of urinary system	**2**
10.	Organogenesis, Development of male and female reproductive system	**2**
11.	Determination of age of different species of embryo	**1**
	Total	**18**

Teaching Lecture Schedule Semester

– III : ANA – 609 (1+0 =1)

Course Title : Wild Life and Forensic Anatomy Theory

Sr. No.	Particulars	No of lectures / Practicals
1.	Introduction, scope and importance of anatomy of wild animals	**1**
2.	Origin, evolution and classification of wild mammals and birds	**1**
3.	Morphological adaptations of wild mammals and birds	**1**
4.	Radiography and ultrasonography as a tool to study wild life anatomy	**1**
5.	Anatomy of skeletal system of Elephants with special emphasis on dentition and ageing and sexual dimorphism	**1**
6.	Anatomy of digestive, respiratory, reproductive and urinary systems of elephants	**1**
7.	Anatomy of skeletal system of wild carnivores including lion, tiger, leopard, cheetah, wolf and fox.	**1**
8.	Anatomy of digestive, respiratory, reproductive and urinary systems of wild carnivores	**1**
9.	Anatomy of skeletal, digestive, respiratory, reproductive and urinary systems of wild ruminants	**1**
10.	Anatomy of skeletal, digestive, respiratory, reproductive and urinary systems of wild primates	**1**
11.	Anatomy of skeletal system of Cervidae family	**1**
12.	Anatomy of digestive, respiratory, reproductive and urinary systems of Cervidae family	**1**
13.	Anatomy of cardio-vascular system of wild animals	**1**
14.	Anatomy of nervous system of wild animals	**1**
15.	Anatomy of sense organs of wild animals	**1**
16.	Anatomy of wild birds	**1**
17.	Application of wild life anatomy in forensic veterinary medicine	**1**
18.	Clinical anatomy of captive wild animals	**1**

Teaching Lecture Schedule

Course Title: Animal Alternatives in Veterinary Anatomy

Theory

Sr. No.	Topics	Particulars	No of lectures / Practicals
1.		Introduction to animal alternatives	1
2.		Ethical issues on alternatives used	**1**
3.		Necessity of animal alternatives- advantages and disadvantages of alternatives	**1**
4.		Scope for animal alternatives	**1**
5.		Plastination, basic principles	**1**
6.		Methodology involved in plastination	**1**
7.		Types of plastination- advantages, disadvantages of plastination	**1**
8.		Three-D, Two-D models as alternatives in veterinary anatomy: advantages/ disadvantages of models used	**1**
9.		Drawings, Charts, Power points as self eXplanatory alternatives in Veterinary anatomy-An overview	**1**
10.		TaXidermy in veterinary anatomy-methodology involved-limitations	**1**
11.		Computer simulation-screen based simulations	**1**
12		Virtual lab.-E-learning as alternatives	**1**
13		Interactive digital tool-multimedia and Videos as effective audio visual tools-benefits and weakness of digital alternatives	**1**
14		Mannequins as alternatives in veterinary anatomy, advantages and disadvantages - scope for mannequins in veterinary anatomy	**1**
15		Museum specimen preparation	**1**
16		Procedures involved in museum preservation-advantages and disadvantages involved in museum specimens	**1**

Practical

Sr. No.	Topics	Particulars	No of lectures / Practicals
1.		Methodology involved in plastination and preparation of plastinated specimens	3
2.		Three-D, Two-D Models as alternatives in veterinary anatomy	**2**
3.		Methodology involved taXidermy - preparation of specimens	**2**
4.		Computer Simulation-screen based simulations	**2**
5.		Virtual lab -E-learning as alternatives	**2**
6.		Interactive digital tool-multimedia and Videos	**1**
7.		Mannequins as alternatives in veterinary anatomy	**2**
8.		Museum specimen preparation	**2**

Course Title with Credit Load Ph.D. in Veterinary Anatomy

Course Code	Course Title	Credit Hours
RPE700	Research and Publication Ethics*	1+1
ANA701	Myology, angiology, neurology and anesthesiology of equine,	2+1
	Canine and porcine	
ANA702	Principles and applications of biomechanics	1+0
ANA703	Aviananatomy	1+1
ANA704	Neuroanatomy	2+1
ANA705	Comparative endocrine anatomy	1+1
ANA706	Theory and applications of electron microscopy	1+1
ANA707	Histoenzymology and immunocytochemistry	2+1
ANA708	Applied embryology and teratology	1+1
ANA709	Functional veterinary anatomy	1+0
ANA710	Gross anatomy of laboratory animals	1+1
ANA711	Cross sectional anatomy of ox	0+1
ANA712	Animal alternatives in veterinary anatomy	1+1
ANA713	Special problem	0+2
ANA714	Doctoral seminar-I	1+0
ANA715	Doctoral seminar-II	1+0
ANA716	Doctoral research	0+75

*Compulsory Major course for Doctorate programme. The other 10 credits can be registered from remaining700Series courss listed above.Suggested list of specified Minor subjects (Departments).

MajorSubject	Supportingsubjects(Departments)*
VeterinaryAnatomy	Biochemistry,Physiology,VeterinaryPathology,Veterinary Gynaecology and Obstetrics, Veterinary Surgery and Radiology, Biotechnology.

*The Minor courses may be taken from any number of disciplines/ departments listed against major discipline limiting to credits prescribed as decided by the Chairman of Advisory Committee of the student.

Minor courses may also be taken from the disciplines/department so ther than those listed aboveon therecommendationsofadvisorycommittee,ifessentiallyrequiredaspertheresearchproblemwith theconcurrenceofHeadoftheDepartmentandConcernedAuthorities.

Course Contents

Ph.D. in Veterinary Anatomy

I. Course Title : **Myology, Angiology, Neurology and Aesthesiology of Equine, Canine and Porcine**

II. Course Code : **ANA 701**

III. Credit Hours :**2+1**

S.No.	Topic	No. of Lectures/ Practicals
Theory		
1.	Comparative study of muscles of head and neck of horse, dog and pig	2
2.	Comparative study of muscles of forelimb:shoulder and arm	1
3.	Comparative study of extensor and flexors of forelimb	1
4.	Comparative study of muscles of abdomen	1
7.	Comparative study of muscles of pelvic region, hindlimb and tail	2
8.	Comparative study of topography and structure of heart, blood Supply to heart	2
9.	Study of arterial supply to head and neck	2
10.	Comparative study of blood supply to the forelimb	1
11.	Study of the collateral and terminal branches of aorta	2
12.	Comparative study of blood supply to the hindlimb	2
13.	Comparative study of venous system	1
14.	Study the lymphatic system	1
15.	Comparative study of brain and spinal cord	2
16.	Study of cranial nerves	2
17.	Study of brachial plexus and its branches	1
18.	Study of cervical, thoracic and lumbar nerves	1
19.	Comparative study of lumbo-sacral plexus	2
20.	Comparative study of eye	1
21.	Comparative study of ear	1
22.	Comparative study of hoof	1
23.	Comparative study of gustatory and olfactory organs	1
	Total	32

Practical

1.	Comparative study of muscles of head and neck of horse, dog and pig	1
2.	Comparative study of muscles of forelimb:shoulder, arm extensors And flexors	1
3.	Comparative study of muscles of abdomen	1
4.	Comparative study of muscles of pelvic region, hindlimb and tail	1
5.	Comparatives tudy of topography and structure of heart, blood Supply to heart	1
6.	Study of arterial supply to head and neck	1
7.	Comparative study of blood supply to the forelimb	1
8.	Study of the collateral and terminal branches of aorta	1
9.	Comparative study of blood supply to the hindlimb	1
10.	Comparative study of venous and lymphatic system	1
11.	Comparative study of brain and spinalcord	1
12.	Study of cranial nerves	1
13.	Study of brachial plexus and its branches	1
14.	Study of cervical, thoracic and lumbar nerves	1
15.	Comparative study of lumbo-sacral plexus	1
16.	Comparative study of eye and ear	1
17.	Comparative study of hoof	1
18.	Comparative study of gustatory and olfactory organs	1
	Total	18

I. CourseTitle :Principles and Applications of Biomechanics
II. CourseCode :ANA 702
III. CreditHours :1+0

S.No.	Topic	No.ofLectures
Theory		
1.	Definition of Biomechanics and its classification.	1
2.	Scope Biomechanics of with reference to anatomy and physiology of Domestic animals	1
3.	Musculo-skeletal dynamics	2
4.	Locomotion and its type in domestic animals	2
5.	Instrumentation and techniques in locomotion and their applications in lameness.	2
6.	Biomechanics of microscopic structures	1
7.	Polariscope,its principle and application	2
8.	Biomechanics of cortical and trabecular bones.	1
9.	Biomechanics of articular cartilages	2
10.	Biomechanics of mammalian body; bowand string theory	2
11.	Biomechanics of fracture fixation	1
12.	Biomechanics of heart	1
	Total	18

I. Course Title :Avian Anatomy
II. Course Code :ANA 703
III. Credit Hours :1+1

S.No.	Topic	No.ofLectures/ Practicals
Theory		
1	The study of gross features of axial and appendicular skeleton of Domestic fowl	1
2	Study of various joints of axial and appendicular skeleton of domestic fowl	2
3	Gross and microscopic study of muscular system of domestic fowl	1

4	Gross and microscopic study of digestive system of domestic fowl.	2
5	Gross and microscopic study of respiratory organs of domestic fowl.	1
6	Gross and microscopic study of urinary organs of domestic fowl.	1
7	Gross and microscopic study of reproductive system of domestic fowl.	1
8	Study of the blood of domestic fowl.	2
9	Gross and microscopic study of circulatory system of domestic fowl.	1
10	Gross and microscopic study of nervous system of domestic fowl.	1
11	Gross and microscopic study of eye and its appendages of domestic fowl.	1
12	Gross and microscopic study of ear of domestic fowl.	1
13	Gross and microscopic study of skin and its appendages of domestic fowl.	1
14	Gross and microscopic study of lymphoid organ of domestic fowl.	1
15	Gross and microscopic study of endocrine system of domestic fowl.	1
	Total	18

Practical

1	The study of gross features of axial and appendicular skeleton of Domestic fowl and turkey	1
2	Study of various joints of axial and appendicular skeleton of domestic fowl	2
3	Gross and microscopic study of muscular system of domestic fowl	1
4	Gross and microscopic study of digestive system of domestic fowl.	2
5	Gross and microscopic study of respiratory organs of domestic fowl.	1
6	Gross and microscopic study of urinary organs of domestic fowl.	1
7	Gross and microscopic study of reproductive system of domestic fowl.	1
8	Study of the blood of domestic fowl.	2
9	Gross and microscopic study of circulatory system of domestic fowl.	1
10	Gross and microscopic study of nervous system of domestic fowl.	1
11	Gross and microscopic study of eye and its appendages of domestic fowl.	1
12	Gross and microscopic study of ear of domestic fowl.	1
13	Gross and microscopic study of skin and its appendages of domestic fowl.	1
14	Gross and microscopic study of lymphoid organ of domestic fowl.	1
15	Gross and microscopic study of endocrine system of domestic fowl.	1
	Total	**18**

I. Course Title :Neuroanatomy
II. Course Code :ANA 704
III. Credit Hours :2+1

S.No.	Topic	No. of Lectures/ Practicals
Theory		
1.	The gross and microscopic study of anatomy of brain, limbic system, reticular formation, lemniscal system, pyramidal system, extra pyramidal system	5
2.	Study of cranial nerves along with their associated nuclei and ganglia	5
3.	The gross and microscopic study of spinal cord including tracts and pathways	4
4.	Study of spinal nerves along with their associated nuclei and ganglia	4
5.	Hypothalamo-hypophysial system	4
6.	Brachial plexus	3
7.	Lumbo-sacral plexus	3
8.	Study of autonomic nervous system	5
	Total	33
Practical		
1.	The gross and microscopic study of anatomy of brain, limbic system, reticular formation, lemniscal system, pyramidal system, Extra pyramidal system	2
2.	Study of cranial nerves along with their associated nuclei and ganglia	2
3.	The gross and microscopic study of Spinal cord including tracts and pathways	2
4.	Study of spinal nerves along with their associated nuclei and ganglia	2
5.	Hypothalamo-hypophysial system	2
6.	Brachial plexus	2
7.	Lumbo-sacral plexus	2
8.	Nerve blocks	2
9.	Study of autonomic nervous system	2
	Total	18

I. Course Title :Comparative Endocrine Anatomy
II. Course Code :ANA 705
III. Credit Hours :1+1

S.No.	Topic	No. of Lectures/ Practicals
Theory		

1.	Introduction and general characteristics of endocrine gland	2
2.	Gross, microscopic and ultrastructural study of Pituitary gland	1
3.	Gross, microscopic and ultrastructural study of thyroid gland	1
4.	Gross, microscopic and ultrastructural study of parathyroid gland	2
5.	Gross, microscopic andultrastructural study of thymus	2
6.	Gross, microscopic and ultrastructural study of adrenal gland	1
7.	Gross, microscopic and ultrastructural study of hypothalamus and Pineal	1
8.	Microscopic and ultrastructural study of islets of Langerhans	2
9.	Gross, microscopic and ultrastructural study of endocrine glands of Male reproductive system	1
10.	Gross, microscopic and ultrastructural study of endocrine glands of Female reproductive system including corpus luteum	2
11.	Study of paraganglia, diffused endocrine system cells, endocrine cells of Heart and kidney	2
12.	Advances in gross and microscopic anatomy of endocrine glands of gastro-intestinal tract	1
	Total	18

Practical

1.	Introduction and general characteristics of endocrine gland	1
2.	Gross, microscopic and ultrastructural study of Pituitary gland	2
3.	Gross, microscopic and ultrastructural study of thyroid gland	1
4.	Gross, microscopic and ultrastructural study of parathyroid gland	1
5.	Gross, microscopic and ultrastructural study of thymus	1
6.	Gross, microscopic and ultrastructural study of adrenal gland	1
7.	Gross, microscopic and ultrastructural study of hypothalamus and Pineal	2
8.	Microscopic and ultrastructural study of islets of Langerhans	1
9.	Gross, microscopic and ultrastructural study of endocrine glands of Male reproductive system	2
10.	Gross, microscopic and ultrastructural study of endocrine glands of Female reproductive system including corpus luteum	2
11.	Study of paraganglia, diffused endocrine system cells, endocrine cells Of heart and kidney	2
12.	Advances in gross and microscopic anatomy of endocrine glands of gastro-intestinal tract	2
	Total	18

I. Course Title :Theory and Applications of Electron Microscope
II. Course Code :ANA 706
III. Credit Hours :1+1

S.No.	Topic	No.ofLectures/ Practicals

Theory

1.	Introduction of the electron microscope	1
2.	Principles of transmission electron microscopy	1
4.	Collection and fixation of samples for electronmicroscopy, various Fixatives used in electron microscopy	2
5.	Principles of scanning electron microscopy and processing of samples For transmission electron microscopy	1

6.	Processing of samples for scanning electron microscopy	1
9.	Ultramicrotomy (semi thin and ultra thin sections)	1
10.	Coating of grids with supportive films	1
11.	Staining of semi thin and ultra thin sections	1
12.	Negative staining	1
13.	Applications of scanning and transmission electron microscopy	1
14.	Cryo-electron microscopy	1
15.	Immunoelectron microscopy	1
16.	Strategies in immunolabelling	1
17.	Applications in nano science	1
	Total	19

Practical

1.	Collection of tissue samples for em	1
2.	Fixation of samples for electron microscopy	1
3.	Processing of samples for scanning electron microscopy	2
4.	Processing of samples for transmission electron microscopy	2
5.	Ultramicrotomy (semi thin and ultra thin sections)	2
6.	Coating of grids with supportive films	2
7.	Staining of semi thin and ultrathin sections	1
8.	Negative staining	1
9.	Cryo-electron microscopy	2
10.	Immunolabelling	2
11.	Atomic force microscope	1
	Total	**17**

I. Course Title :Histoenzymology and Immunocytochemistry
II. Course Code :ANA 707
III. Credit Hours :2+1

S.No.	Topic	No. of Lectures/ Practicals

Theory

1.	Classification of enzymes	3
2.	Principles of enzyme histochemistry methods	3
3.	Substrate and coenzymes	2
4.	Different methods of enzyme study	3
5.	Hydrolytic enzyme histochemistry	2
6.	Alkaline and acid phosphatase	2
7.	Oxidases and peroxidases	2
8.	Diaphorases and dehydrogenases	2
9.	Peptidases	2
10.	Fluorescence microscopy	2
11.	Principles of immune histochemistry	3
12.	Techniques in immune histochemistry	3
13.	Study of part different parts of cryotome and their functions	3
	Total	32

Practical

1.	Preparation of fixatives and buffers	3
2.	Demonstration of alkaline and acid phosphatase	2
3.	Demonstration of succinic dehydrogenase	2
4.	Demonstration of cytochrome oxidase	2
5.	Localization of diaphorases and cholineesterase	2
6.	Fluorescence microscopy	2
7.	Principles and techniques in immunohistochemistry	3
	Total	**16**

I. Course Title :Applied Embryology and Teratology
II. Course Code :ANA 708
III. Credit Hours :1+1

S.No.	Topic	No. of Lectures/ Practicals

Theory

1.	Introduction to embryology and teratology.	1
2.	Principles of experimental embryology and teratology.	2
3.	Factors affecting the developmental mechanisms of embryo.	2
4.	Developmental anomalies of cardiovascular system	2
5.	Immunodeficiency and inherited defects in natural immunity	1
6.	Developmental anomalies of brain and spinal cord	2
7.	Developmental anomalies of skeletal system	1
8.	Developmental anomalies of digestive system	2
9.	Developmental anomalies of urinary system	1
10.	Developmental anomalies of male and female reproductive system	1
11.	Congenital malformations of face and oral cavity	1
12.	Congenital and inherited defects of skin	1
13.	Genetic, chromosomal and environmental factors adversely affecting Prenatal development	1
	Total	18

Practical

1.	Discussion on principles and factors affecting developmental embryology And teratology in the available literature.	2
2.	Study on different teratological models / specimens of cardiovascular system	2
3.	Immunodeficiency and inherited defects in natural immunity	1
4.	Study on differ entteratological models / specimens of brain and spinal cord	2
5.	Study on different teratological models / specimens of skeletal system	1
6.	Study on different teratological models / specimens of digestive system	2
7.	Study on different teratological models / specimens of urinary system	1
8.	Study on different teratological models / specimens of male and female reproductive system	2

9.	Congenital malformations of face and oral cavity	1
10.	Congenital and inherited defects of skin	1
11.	Study on mutations and chromosomal abnormalities	1
12.	Study of teratogenic agents	1
13.	Assessing the aetiology of different congenital diseases	1
	Total	18

I. Course Title **:Functional Veterinary Anatomy**
II. Course Code **:ANA 709**
III. Credit Hours **:1+0**

S.No.	Topic	No. of Lectures
Theory		
1.	Introduction to functional anatomy	1
2.	Tissue organization and function	1
3.	Functional anatomy of digestive system :mouth cavity, tongue, Salivary gland, esophagus and stomach including mastication, regurgitation	2
4.	Functional anatomy of digestive system :small intestine, large intestine, liver, gallbladder and pancreas	2
5.	Study of functional anatomy of respiratory system	1
6.	Functional anatomy of urinary system	1
7.	Functional anatomy of reproductive system	1
8.	Functional anatomy of mammary gland	1
9.	Functional anatomy of cardiovascular system	1
10.	Functional anatomy of central nervous system	1
11.	Functional anatomy of peripheral and autonomic nervous system	1
12.	Functional anatomy of special senses (vision,hearing)	1
13.	Functional anatomy of skeleton system including synovial fluid	1
14.	Functional anatomy of muscular system	1
15.	Functional anatomy of endocrine system	1
16.	Functional anatomy of integumentary system	1
	Total	18

I. Course Title :Gross Anatomy of Laboratory Animals
II. Course Code :ANA 710
III. Credit Hours :1+1

S.No.	Topic	No. of Lectures/ Practicals
Theory		
1.	An overview of skeleton of rabbit, guinea pig, mice and rat	1
2.	Digestive system of rabbit and guinea pig	1
3.	Digestive system of mice and rat	1
4.	Respiratory system of rabbit and guinea pig	1
5.	Respiratory system of mice and rat	1
6.	Urinary system of rabbit and guinea pig	1
7.	Urinary system of mice and rat	1
8.	Male reproductive system of rabbit and guinea pig	1
9.	Male reproductive system of mice and rat	1
10.	Female reproductive system of rabbit and guinea pig	1
11.	Female reproductive system of mice and rat	1
12.	Endocrine glands of rabbit and guinea pig	1
13.	Endocrine glands of mice and rat	1
14.	Circulatory system of rabbit and guinea pig	1
15.	Circulatory system of mice and rat	1
16.	Nervous system of rabbit and guinea pig	1
17.	Nervous system of rat and mice	1
18.	Lymphoid organs of laboratory animals	1
	Total	18
Practical		
1.	Study of skeleton of rabbit, guinea pig, mice and rat	1
2.	Study of digestive system of rabbit and guinea pig	1
3.	Study of digestive system of mice and rat	1
4.	Study of respiratory system of rabbit and guinea pig	1
5.	Study of respiratory system of mice and rat	1
6.	Study of urinary system of rabbit and guinea pig	1
7.	Study of urinary system of mice and rat	1
8.	Study of male reproductive system of rabbit and guinea pig	1
9.	Study of male reproductive system of mice and rat	1
10.	Female reproductive system of rabbit and guinea pig	1
11.	Study of female reproductive system of mice and rat	1
12.	Study of endocrine glands of rabbit and guinea pig	1
13.	Study of endocrine glands of mice and rat	1
14.	Study of circulatory system of rabbit, guinea pig ,rat and mice	1
15.	Study of circulatory system of mice and rat	1
16.	Study of nervous system of rabbit and guinea pig	1
17.	Study of nervous system of rat and mice	1
18.	Lymphoid organs of laboratory animals	1
	Total	18

I. Course Title :Cross Section Anatomy of Ox
II. Course Code :ANA 711
III. Credit Hours :0+1

S.No.	Topic	No. of Practicals
Practical		
1.	Cross sectional profile of head at the level of 4th incisor and first Cheek tooth	1
2.	Cross sectional profile of head at the level of third cheek tooth and 6th cheek tooth	1
3.	Crosssectionalprofileofheadatthelevelofforbitandexternal acousticmeatus	1
4.	Cross sectional profile of the neck at the level of upper third and Middle third.	1
5.	Cross sectional profile of the neck at the level of lower third	1
6.	Cross sectional profile of the thoracic inlet.	1
7.	Cross sectional profile of the thorax at the level of 3rd rib	1
8.	Cross sectional profile of the thorax at the level of 6th rib and 12th rib	1
9.	Cross sectional profile of the abdomen at the level of 2nd lumbar and 5th lumbar	1
10.	Cross sectional profile of the mid pelvis and tail.	1
11.	Cross sectional profile at the middle and lower level of the shoulder And middle level of the arm.	1
12.	Cross sectional profile at the proximal level of forearm, lower level of The forearm and midlevel of metacarpus.	1
13.	Cross sectional profile at the mid level of the first phalanges and mid Level of second phalanges	1
14.	Cross sectional profile at the upper and middle and lower levels of The thigh	1
15.	Cross sectional profile at the lower levels of the thigh	1
16.	Cross sectional profile at the upper and middle levels of the eg.	1
17.	Cross sectional profile at the lower level of the leg and mid level Of metatarsus	1
	Total	17

I. Course Title :Animal Alternatives in Veterinary Anatomy
II. Course Code :ANA 712
III. Credit Hours :1+1

S.No.	Topic	No. of Lectures/ Practicals
Theory		
1.	Introduction to animal alternatives	1
2.	Ethical issues on alternatives used	1
3.	Necessity of animal alternatives- advantages and disadvantages of alternatives	1
4.	Scope for animal alternatives	1
5.	Plastination, basic principles	1
6.	Methodology involved in plastination	1
7.	Types of plastination- advantages, disadvantages of plastination	1
8.	Three-D, Two-D models as alternatives in veterinary anatomy: advantages/ disadvantages of models used	1
9.	Drawings, Charts, Power points as self explanatory alternatives in Veterinary anatomy-An overview	1
10.	Taxidermy in veterinary anatomy- methodology involved-limitations	1
11.	Computers imulation- screen based simulations	1
12.	Virtual lab.-E-learning as alternatives	1
13.	Interactive digital tool- multimedia and Videos as effective audio visual tools- benefits and weakness of digital alternatives	1
14.	Mannequins as alternatives in veterinary anatomy, advantages and disadvantages-scope for mannequins in veterinary anatomy	1
15.	Museum specimen preparation	1
16.	Procedures involved in museum preservation-advantages and disadvantage s involved in museum specimens	1
	Total	16

S.No.	Topic	No. of Lectures/ Practicals
Practical		
1	Methodology involved in plastination and preparation of plastinated specimens	3
2	Three-D, Two-D Models as alternatives in veterinary anatomy	2
3	Methodology involved taxidermy- preparation of specimens	2
4	Computer Simulation –screen based simulations	2
5	Virtual lab-E- learning as alternatives	2
6	Interactive digital tool-multimedia and Videos	1
7	Mannequins as alternatives in veterinary anatomy	2
8	Museum specimen preparation	2
	Total	16

I. Course Title :Special Problem
II. Course Code :ANA 713
III. Credit Hours :0+2

S.No.	Topic	No. of Practicals
1.	Short research problem(s) involving contemporary issues And research techniques.	32

IV. Recommended list of Books Gross Anatomy

- Dyce KM, Sack WO and Wensing CJG. 1996. *Text Book of Veterinary Anatomy*. W.B. Saunders Co.
- KonigHEandLiebichHG.2004.*VeterinaryAnatomyofDomesticAnimals:Textbookand Colour Atlas.*1st edn., Stuttgart, Schattauer Co., Germany.
- NickelR,SchumerA,SeiferleE,FreewinJandWillsKH.1986.*TheLocomotorSystemof DomesticMammals.*VerlagPaulParey.
- Schummer A, Nickel R and Sack WO. 1979. *The Viscera of the Domestic Mammals*. Verlag Paul Parey.
- SeiferleE.1975.*NervousSystem,SensoryOrgans,EndocrineGlandsofDomesticMammals.* VerlagPaulParey.
- SissonSandGrossmanJD.1975.*TheAnatomyoftheDomesticAnimals*.Vols.I,II.W.B. Saunders Co.

Histology

- BanksWJ.1993.*AppliedVeterinaryHistology*.MosbyYearBook,USA.
- DellmannHD.1993.*TextbookofHistology*.LeaandFebiger,USA.
- DiFiore MS, Mancini R and Derbertis EDP. 2006. *New Atlas of Histology*. Williams and Wilkins, Lippincott, USA.
- EurellJAandFrappierBL.2006.*Dellmann's Textbook o fVeterinary Histology*.6th edn., Blackwell Publishing, Ames, Iowa, USA.
- GreepRO.1977.*Histology*.McGraw-HillBookCo.,NewYork,USA.

- HamAWandCormackDH.1979.*Histology*.J.B.Lippincott,Philadelphia,USA.
- StinsonAWandCalhounML.1993.*TextbookofVeterinaryHistology*.4thedn.,LeaandFe biger, Philadelphia, USA.

Embryology

- AreyLB1965.*DevelopmentalAnatomy*.W.B.Saunders.
- FreemanWHandBraceGirdleB.1967.*Atlasof Embryology*.HeilemannEdu.BooksLtd.
- LangmanJ.1976.*MedicalEmbryology*.WilliamandWilkin,Lippincott,USA.
- Latshaw WK. 1984. *Veterinary Developmental Anatomy; A Clinically Oriented Approach*. B.C. Decker Inc., Philadelphia, USA.
- PattenBM.1985.*FoundationofEmbryology*.TataMcGraw-HillBookCo.,USA.
- PattenBM.2014.*Foundationof Embryology*.6thedn.,TataMcGraw-HillEducation, India.
- Tuchmann-Duplessis,MHDavidG,andHaegelP.1972.*IllustratedHumanEmbryology*.Vol. I,II.Embryogenesis.SpringerVerlag,USA.

AnatomicalTechniques

- DurryRABandWallingtonEA.1967.*Carleton'sHistologicalTechniques*.OxfordUniversi ty Press, London.
- LunaLG1968.*ManualofHistologicStainingMethodsoftheArmedForcesInstituteof Pathology*.McGraw-HillBookCo.,USA.
- PearseAGE.1968.*Histochemistry-TheoreticalandApplied*.3rdedn.,Vol.I,Churchill Livingstone, London.
- TompsettDHandWakeleySC.1956.*AnatomicalTechniques*.E.andW.LivingStone,London.
- BancroftJDandStevensA.1977.*TheoryandPracticeofHistologicalTechniques*.Churc hill Livingstone.
- ThomsonSWandHuntRD.1968.*SelectedHistochemicalandHistopathologicalMethods*. CharlesC.ThomasPublication,Springfield,Illinois,USA.

ListofJournals

- *ActaAnatomica*
- *AmericanJournalofAnatomy*
- *AnatomiaHistologiaandEmbryologia*
- *AnatomicalRecord*
- *AnatomyandEmbryology*
- *IndianJournalofVeterinaryAnatomy*
- *JournalofAnatomy*

e-Resources

- http://www.interscience.wiley.com/journal/117927935/grouphome/home. (American Journalof Anatomy)
- http://www.ovid.com/site/catalog/Journal/1057.jsp(JournalofAnatomy)
- http:http:www.interscience.wilety.com/jpages/0003-276X/(AnatomicalRecord)
- http://www.blackwellpublishing.com/submit.asp(AnatomiaHistologiaandEmbryologia)

1. Teaching Schedule: UG, PG, PhD - Prepared by – Course Teacher – Year wise / Course Wise

2. Academic Calendar – UG, PG, PhD -Year wise / Semester Wise

3. College Classes Time Table: UG, PG, PhD - Year wise / Semester Wise

4. Examination Time Table – UG, PG, PhD - Semester / Year wise - Theory and Practical

Result –UG, PG, PhD - Semester Wise / Year Wise