Academic:

1.

Degree Offered –	UG	PG	PhD
Title of degree:	**B.V.Sc &A.H.**	**M.V.Sc**	**PhD**
Duration:	**5½ years**	**2 years**	**3 years**
Eligibility Criteria:	**12 th Science Pass & NEET**	**B.V.Sc & A.H. and Entrance Test conducted by ICAR**	**M.V.Sc and Entrance Test conducted by ICAR**
Intake Capacity:	**80**	**23**	**12**
Opportunities:			

2. Course offered :: UG, PG , PhD - Semester / Year wise
   - List of UG Courses (B.V.Sc & AH) As per latest MSVE Guidelines) , B.Tech. (D.T.) and B.F.Sc as per ICAR – V Deans Committee – 2016.

Sr No	Course No.	Title	Credit	Course offered in the Year
1	VPY	Veterinary Physiology	4+1 = 5	I Year

   - List of PG Courses (MVSc) and M.Tech. (Dairy Technology)

Major courses in Veterinary Physiology for MVSc

Sr No	Course No.	Title	Credit	Semester
1	VPY 601	Physiology of Digestion	2+1	Semester I
	VPY 602	Cardiovascular physiology	2+1	Semester I
	VPY 604	Haematology	2+1	Semester I
	VPY 603	Renal Physiology and Body Fluid Dynamics	2+1	Semester I
	VPY 605	Growth and Environmental Physiology	2+0	Semester II
	VPY 606	Physiology of Animal Reproduction	2+1	Semester II
	VPY 607	Clinical physiology	1+1	Semester II
	VPY 608	Neuromuscular physiology	2+0	Semester II
	VPY 609	Endocrinology of Domestic Animals	2+0	Semester III
	VPY 610	Research techniques in Veterinary Physiology	0+2	Semester III
	VPY 612	Masters seminar	1+0	Semester III
	VPY 613	Masters Research	0+10	Semester III
	VPY 611	Physiology of wild life	1+0	Semester III
	VPY 613	Masters Research	0+20	Semester IV

Major courses in Veterinary Physiology for PhD (In-service)

Semester –I			
CourseNo.	**CourseTitle**	**Credits**	**Core/Optional**
VPY–703	Advances inRuminantDigestion	2 +1= 3	Core

VPY–704	AdvancesinNeuro– Endocrinology	2 +1= 3	Core
VPY–701	AppliedPhysiologyofBodyFluidsandElectrolytes	2 +1= 3	Optional
VPY–702	PhysiologyofAnimalBehaviour	2 +0= 2	Optional
Semester–II			
VPY–707	PhysiologyofLactation	2 +1= 3	Core
VPY–712	AdvancesinReproductivePhysiology	2 +1= 3	Core
VPY–705	MyophysiologyandKinesiology	2 +0= 2	Optional
VPY–706	AvianPhysiology	2 +1= 3	Optional
VPY–708	AdvancesinEnvironmentalPhysiologyandGrowth	2 +1= 3	Optional
Semester –III			
RPE–700	ResearchandPublicationEthics	1 +1= 2	Core
VPY–713	DoctorateSeminar –I	1 +0= 1	Core
VPY–714	DoctorateSeminar – II	1 +0= 1	Core
VPY–709	CellularandMolecularPhysiology	2 +1= 3	Optional
VPY–710	AdvancesinImmunophysiology	2 +1= 3	Optional
VPY–711	PhysiologyofStress	2 +0= 2	Optional
Semester –IV-VIII			
VPY–715	DoctorateResearch	0 +75 =75	Core

Major courses in Veterinary Physiology for Ph.D (Regular)

Semester –I			
VPY–703	Advances in Ruminant Digestion	2 +1= 3	Core
VPY–704	Advances in Neuro -Endocrinology	2 +1= 3	Core
VPY–701	AppliedPhysiologyofBodyFluidsandElectrolytes	2 +1= 3	Optional
VPY–702	PhysiologyofAnimalBehaviour	2 +0= 2	Optional
Semester–II			
VPY–707	PhysiologyofLactation	2 +1= 3	Core
VPY–712	AdvancesinReproductivePhysiology	2 +1= 3	Core
VPY–705	MyophysiologyandKinesiology	2 +0= 2	Optional
VPY–706	AvianPhysiology	2 +1= 3	Optional
VPY–708	AdvancesinEnvironmentalPhysiologyandGrowth	2 +1= 3	Optional
Semester –III			
VPY–713	DoctorateSeminar - I	1 +0= 1	Core
VPY–714	DoctorateSeminar -II	1 +0= 1	Core

RPE–700	ResearchandPublicationEthics	1 +1= 2	Core
VPY–709	CellularandMolecularPhysiology	2 +1= 3	Optional
VPY–710	AdvancesinImmunophysiology	2 +1= 3	Optional
VPY–711	PhysiologyofStress	2 +0= 2	Optional
Semester–IV-VI			
VPY–715	DoctorateResearch	0 +75 =75	Core

ListofCommonCoursesforPGprogramme

CourseTitle	Credits
LIBRARYANDINFORMATIONSERVICES	0 +1 =1
TECHNICALWRITINGANDCOMMUNICATIONSSKILLS	0 +1 =1
INTELLECTUALPROPERTYANDITSMANAGEMENTINAGRICULTURE	1+0=1
BASICCONCEPTSINLABORATORYTECHNIQUES	0+1 =1
AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENTPROGRAMMES	1+0=1

3. Lecture Schedule – UG, PG , PhD - Theory / Practical Schedule – Approved by BoS – Subject wise

UNIT- I
(BLOOD, CARDIOVASCULAR, NERVOUS AND MUSCULAR SYSTEMS)

UNIT I: THEORY

Lecture No.	Grand total of lecture	Topic
1	1	Introduction to blood, properties of blood as a body fluid
2	2	Plasma proteins, lipids- origin and function
3	3	R-E System, erythropoiesis, metabolism and fate of R.B.C.
4-5	4-5	Hemoglobin: chemical structure, synthesis, physiological functions, derivatives of hemoglobin
6-7	6-7	Haemorrhage;haemostasis, platelets, coagulation mechanisms and regulation of haemostasis; fibrinolysis; anticoagulation mechanism, anemia
8	8	Leucocyte - phagocytic and immunogenic functions
9-10	9-10	Heart: morphological characteristic, systemic excitability conduction and transmission processes
11	11	Cardiac cycle
12-13	12-13	Regulation of cardiac output, extrinsic and intrinsic regulation; coronary circulation, haemodynamics of circulation, circulatory mechanics, resistance to flow
14	14	Properties of pulse; metabolism and energetic of working myocardial cell
15	15	Control of blood pressure: nervous and circulating fluid volume controls of blood pressure
16-17	16-17	Circulatory controls, shock stresses, adjustment of circulation during exercise
18	18	Capillary exchange, regional and foetal circulation
19	19	Electrocardiograph, its significance in Veterinary Sciences, echocardiography.
20	20	Muscle Physiology: basic muscle unit characteristic
21-22	21-22	Electrical phenomenon in muscle cell: muscle action potential, excitation and propagation of impulse characteristics: latent period, refractiveness, threshold

		level, all and none characteristics
23	**23**	Contractile mechanism, excitation-contraction coupling, neuro-muscular transmission
24	**24**	Types of muscle contraction, phenomenon of fatigue, rigor mortis
25	**25**	Neurohormonal control of vascular smooth muscle, vasoconstriction, vasodilation
Internal assessment I (26 marks)		
26-27	**26-27**	Nervous System: membrane potential, ionic basis of resting membrane potential (RMP), nerve action potential, excitation and propagation of impulse characteristics. Latent period, refractiveness, threshold level, all and none characteristics. Degeneration and regeneration of nerve fibre
28	**28**	Basic functional unit (neuron) structure, type, functional characteristics of sub-units of neuron
29-30	**29-30**	Mechanism of information processing, synaptic and junctional transmission and neurotransmitters, types and functions of nerve fibers
31	**31**	Organization of nervous system, functions of nervous system (brain, spinal cord), hierarchical control
32	**32**	Autonomic nervous system and visceral control
33-34	**33-34**	Reflexes (reflex arc, action, types of reflexes); mid brain, reticular formation and functions; control of posture and movements.
35	**35**	Major function system- sensory, consciousness, emotion, motor and visceral control, wakefulness and sleep cycle
36	**36**	Higher function of neurons system - learning, memory; electroencephalography
37-38	**37-38**	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
39	**39**	Ear: Physiology of hearing and common hearing impairment,vestibule apparatus
40	**40**	Physiology of olfaction and taste
Internal assessment II (15 marks)		

UNIT-I: PRACTICAL

Lecture No.	**Grand total of practical**	**Topic**
1	**1**	Collection of blood samples - separation of serum and plasma,preservation of de-fribrinated blood, coagulation time and bleeding time
2	**2**	Enumeration of erythrocytes
3	**3**	Enumeration of leucocytes
4	**4**	Differential leucocytic count
5	**5**	Platelet count
6	**6**	Estimation of hemoglobin
7	**7**	Haematocrit - Packed Cell Volume, Erythrocyte Sedimentation Rate
8	**8**	Erythrocyte fragility and viscosity
9	**9**	Blood grouping
10	**10**	Recording of ECG (Demonstration).
11	**11**	Measurement of arterial blood pressure (Sphygmomanometry)
12	**12**	Simulation experiments on Nerve - muscle and heart physiology

UNIT-II
(DIGESTIVE AND RESPIRATORY SYSTEMS)

UNIT-II THEORY

Lecture No.	Grand total of lecture	Topic
1	41	Introduction. Morphological characteristic of monogastric and poly-gastric digestive system
2	42	Developmental aspects of digestion, prehension, mastication
3	43	Details of rumen and rumen environment, rumination
4-5	44-45	Regulation of secretory functions of saliva, salivation, stomach and intestine
6	46	Pancreas and bile secretion
7-8	47-48	Digestion (enzymatic and microbial) in monogastric animals. Luminous, membranous and microbial (fermentative) digestion in monogastric intestine.
9-10	49-50	Digestion (enzymatic and microbial) in ruminants. Luminous and membranous and microbial (fermentative) digestion in rumen, modification of toxic substances in rumen
11	51	Permeability characteristics of intestine, forces governing absorption, control of intestinal transport of electrolyte and water
12	52	Hunger, appetite control, defecation and vomition
13	53	Digestion in birds.
Internal assessment I (14 marks)		
14	54	Functional morphology of respiratory apparatus,mechanics of breathing
15-16	55-56	Exchange of gases in lungs and tissues. Pressures, recoil tendency, elasticity, surfactants, pleural liquid andcompliance
17-18	57-58	Transport of blood gases, dissociation curves, foetal and neonatal oxygen transport
19-20	59-60	Neural and chemical regulation of breathing, diffusion, perfusion and hypoxia
21	61	Frictional resistance to air flow, airways smooth muscle contraction, respiratory muscle work and panting
22-23	62-63	Adaptation of respiration during muscle exercise, high altitude hypoxia, non-respiratory lung functions
24	64	Respiration in birds
Internal assessment II (11 marks)		

UNIT-II: PRACTICAL

Lecture No.	Grand total of practical	Topic
1	13	Collection and physical examination of rumen liquor
2	14	Bacterial count in rumen liquor
3	15	Protozoal count in rumen liquor
4	16	Estimation of volatile fatty acids in rumen liquor
5	17	Estimation of ammonia nitrogen in rumen liquor
6	18	*In-vitro* action of proteolytic enzymes- amylase
7	19	*In-vitro* action of proteolytic enzymes- pepsin and trypsin
8	20	Recording of respiration
9	21	Spirometry: recording of volume and capacities in different physiological states including determination of vital capacities
10	22	Counting of rumen motility and recording of rumeno-intestinal movements (Demonstration)

UNIT-III (EXCRETORY AND ENDOCRINE SYSTEMS)

UNIT-III: THEORY

Lecture No.	Grand total of lecture	Topic
1	65	Kidney: functional morphology of nephrons

2	**66**	Factors determining filtration pressure, determination of glomerular filtration rate (GFR) and renal plasma flow
3-4	**67-68**	Urine formation: re-absorption mechanisms for glucose, protein, amino acids, electrolytes and ammonium;glomerulo-tubular balance
5	**69**	Urine concentration:micturition, uremia
6	**70**	Methods of studying renal functions
7	**71**	Formation and excretion of urine inbirds
Internal assessment II (7 marks)		
8-9	**72-73**	Fluid, water balance, fluid therapy, dehydration, water concentration mechanisms and thirst
10-11	**74-75**	Acid base balance and H^+ regulation, correction and evaluation of imbalances, total osmotic pressure
12	**76**	Cerebrospinal fluid, synovial fluids: composition, formation and flow; joints
13	**77**	Regulation of bone metabolism and homeostasis
14-15	**78-79**	Hormone cell interaction (receptors), sub-cellular mechanisms, metabolism of hormones
16	**80**	Mechanism of hormone regulation,methods of study of endocrine system
17	**81**	Hypothalamo-hypophyseal hormones - development of the gland, location, histological details/ cells, hormones
18	**82**	Hypothalamo-hypophyseal hormones - chemistry of hormones, control, physiological actions, dysfunctions
19-20	**83-84**	Thyroid: development of the gland, location, histological details / cells, hormones, chemistry and synthesis of hormones, control, physiological actions
21	**85**	Thyroid: dysfunctions ; hypo- and hyper-thyroidism, goiter and types, treatment etc
22	**86**	Pancreas:development of the gland, location, histological details / cells, hormones
23	**87**	Pancreas: chemistry of hormones, control, physiological actions, dysfunctions – diabetes mellitus
24-25	**88-89**	Adrenals:adrenal cortex - development of the gland, location, histological details / cells, hormones, chemistry and synthesis of hormones, control, physiological actions, dysfunctions – Cushing syndrome etc. Renin-angiotensin mechanism
26	**90**	Adrenals:adrenal medulla - development of the gland, location, histological details / cells, hormones, chemistry and synthesis of hormones, control, physiological actions, differences and similarities
Internal assessment III (19 marks)		
27	**91**	Hormones of calcium metabolism:parathyroid gland - development of the gland, location, histological details / cells, hormones, control, chemistry of hormones, physiological actions, dysfunctions
28-29	**92-93**	Hormones of calcium metabolism: calcitonin and vitamin D,disorders and differences
30	**94**	Erythropoietin, atrial natriuretic factors and pheromones
31-32	**95-96**	Thymus, pineal, prostaglandins
33	**97**	GI hormones, leptin, grehlin

UNIT-III: PRACTICAL

Lecture No.	**Grand total of practical**	**Topic**
1	**23**	Urine analysis - physiological constituents
2	**24**	Urine analysis - pathological constituents
3	**25**	Determination of glomerular filtration rate
4	**26**	Titrable acidity of urine
5	**27**	Determination of inorganic phosphorus in urine
6	**28**	Determination of ammonia nitrogen in urine
7	**29**	Determination of creatinine in urine
8	**30**	Bioassay for tropic hormone.
9	**31**	Demonstration of hormone estimation

UNIT-IV (REPRODUCTION, LACTATION, GROWTH AND ENVIRONMENTAL PHYSIOLOGY)

UNIT-IV: THEORY

Lecture No.	Grand total of lecture	Topic
1-2	**98-99**	Genetic and endocrine control of gonadal development, modification of gonadotrophin release, puberty and photoperiod
3	**100**	Functional anatomy of female reproductive tract
4-5	**101-102**	Ovarian functions, oogenesis, follicular development, dynamics, endocrine and receptor profiles, ovarian cycle
6-7	**103-104**	Ovulation, ovum transport, progestogens, estrogens, sexual receptivity
Internal assessment II (7 marks)		
8	**105**	Oestrous cycle, reproductive cycles in farm animals, post-partum ovarian activity
9-10	**106-107**	Functional anatomy of male reproductive tract, testosterone - functions and regulation, cryptorchidism, uses of androgens
11	**108**	Spermatogenic cycle and wave: functions of sertoli cell and leydig cell, semen – composition and evaluation, capacitation
12	**109**	Mating, fertilization
13	**110**	Pregnancy/ gestation: period of ovum, embryo and foetus, hormones present in the biological fluids during pregnancy and their uses for the diagnosis of pregnancy
14	**111**	Placentation: types and functions, maternal foetal placental participation in pregnancy and parturition, immunology of gestation
15	**112**	Parturition: preparturient endocrine status
16	**113**	Functional and metabolic organization of mammary glands: structure and development; effect of estrogens and progesterone
17	**114**	Hormonal control of mammary growth; lactogenesis and galctopoiesis
18	**115**	Biosynthesis of milk constituents, secretion of milk and metabolism, prolactin and lactation cycle
19	**116**	Clinical aspects of endocrine - reproductive functions
20-21	**117-118**	Growth: concept, cellular hyperplasia and hypertrophy and other aspects etc. Biochemical and genetic determinants of growth, regulation of growth, metabolic and hormone interactions
22	**119**	Developmental Horizons - organogenesis, growth curves
23	**120**	Factors affecting efficiency of growth and production in ruminants and simple stomach animals
24	**121**	Growth in meat producing animals and birds, protein deposition in animals and poultry
25	**122**	Recombinant gene transfer technologies for growth manipulation: advantages andlimitations
26	**123**	Effect of climate on growth
27	**124**	Climatology: various parameters and their importance, climate, weather, concepts, macro and micro climate
28-29	**125-126**	Body temperature and hibernation, thermoregulation in farm animals, role of skin, responses of animals to heat and cold
Internal assessment III (21 marks)		
30-31	**127-128**	Heat exchange mechanisms,heat balance, heat tolerance, thermoneutral zone, hypothermia, hyperthermia and fever
32	**129**	Acclimation, acclimatization - general adaptive syndrome. Circadian rhythm
33	**130**	Temperature regulation in birds
34	**131**	Effect of different environmental variables like temperature, humidity, light, radiation, altitude on animal performance
35-36	**132-133**	Types of behaviour, neurophysiology of behaviour, communication, learning and memory, behavioural plasticity

UNIT-IV: PRACTICAL

Lecture No.	Grand total of practical	Topic
1	32	Oestrus and phases of oestrous cycle in animals (vaginal mucus)
2	33	Behavioural signs of oestrus. Behaviour of animals- mating behavior, feeding behaviour (live or video graphicorcomputer simulated demonstration
3	34	Sperm motility, sperm concentration
4	35	Live and dead, abnormal sperm count
5	36	Measurement of growth in various species. Measuring surface area of animals.
6	37	Health parameters of animals: body temperature, pulse, respiration and heart rate
7-8	38-39	Measurement of animal environmental conditions

M.V.Sc.: Lecture schedule

CourseTitle :PhysiologyofDigestion
CourseCode :VPY601C
reditHours :2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	Basiccharacteristicsandcomparativephysiologyofdigestivesystemofdomesticanimals.Classificationofanimalsonthebasisoffeeding habits,differencesintheanatomyofdigestivetract	1
2.	GeneralfunctionsofGastrointestinaltractanditscontrol	1
3.	Functionalanatomyofdigestivetractofmonogastricanimals-structuraldifferencesamongthemonogastricanimals	1
4.	Functionalanatomyofdigestivetractofruminants:Developmentofruminantstomach	1
5.	Structuraldetailsofrumen,reticulum,omasumandabomasum,Rumino-reticularmotility,itssignificanceandcontrol	2
6.	Pseudoruminants,reticulargroovereflex,rumination processanditsphases.	1
7.	Prehension,prehensileorgansindifferentanimals,grazing,browsing,rooting,mastication,deglutition,feedintake,water requirementsandintake,drinkinghabitsofwaterindifferentanimals	1
8.	Motilityofesophagus,gastro-intestinalmotility,primaryperistalsis andsecondaryperistalsis,functionsandzonesofstomach	1
9.	Rateofgastricemptying,interdigestivemotilitypatterns,migratingmyoelectriccomplex,emesisorvomiting	2
10.	Motilityinsmallintestine,nervousandhormonalcontrol,peristalticreflexandsegmentationreflex.Motilityinlargeintestine:caecum,colon,haustralcontractions,oralandaboralperistalticcontractions, antiperistalticcontractions,Rateofpassageofdigestaanditsestimation	2
11.	Appetiteandcontroloffeedintake,hungercontractions,thirst, constipation,defecation,diarrhea	1
12.	RegulationofGITfunctions,gastro-intestinalhormonesandtheirFunctions	1

13.	Salivarysecretion,itscompositionandfunctions	1
14.	Secretionofgastricjuice,phasesofgastricsecretion,composition,Zymoge n,autocatalysisanddigestioninstomach	2
15.	Pancreaticjuice,secretion,controlandcomposition	1
16.	Proteases,lipases,amylasesandotherenzymesofpancreaticjuice.	1
17.	Trypsininhibitorandendproductsofpancreaticdigestion	1
18.	Liver,structureofliverlobule:secretionofbileanditsregulation, bileacids,bilesalts,bilepigments:functionsofbile	1
19.	Enterohepaticrecirculation:gallbladderfunctionandcontractions.	1
20.	Intestinaljuices,theirsecretions,compositionandfunctions	1
21.	Absorptionofnutrientsinthedigestivetractandtheeffectofnutrient Interactions	1
22.	Bacterialfermentationinlargeintestine,fermentativeproducts, absorptionofendproductsoffermentation	1
23.	Metabolismandexcretionofvariousnutrients,	1
24.	Developmentofruminantsystemandrumenenvironment	1
25.	Rumenmicrobiology,Rumenmicrobes:classificationofrumenbacteria, protozoa,fungi	2
26.	Ruminantmicrobialdigestion,Fermentationpathways:fermentationof carbohydrates,proteinandfat,microbialactivitiesinruminantstomachandint estine	2
27.	Rumendegradableproteins,rumenundegradableproteinsandurea Feeding	1
28.	Volatilefattyacids,Absorptionofendproductsandplaceof absorptionandmechanismofabsorption	1
29.	Advantagesanddisadvantagesofruminantdigestion,artificialrumen	1
30.	Digestioninbirds:functionalanatomyofaviandigestivesystem,swallowing, crop,proventriculus,ventriculus,caeca,nitrogen Metabolism	1
	Total	**36**

Practical

Sr. No.	**Topic**	**No. ofPractic als**
1.	Collectionofsalivaanditsenzymaticstudies	1
2.	Gastricandintestinalmotility,Rateofpassageofdigestaanditsestimatio n	2
3.	Rumino-reticularmovements	1
4.	Activityofpepsinandtrypsinenzymes	1
5.	Estimationofdigestivemetabolitessuchasglucoseandketonebodies,	1
6.	Estimationof$_{\text{triglycerides}}$,cholesterol	1
7.	Estimationofureanitrogenandtotalproteins	1
8.	Liverfunctiontests	2
9.	Pancreaticfunctiontests	1
10.	Methodsofcollectionofrumenliquor,meritsanddemerits	1
11.	DeterminationofpH,totalvolatilefattyacidsinrumenliquor	1
12.	Determinationofammonia-nitrogenandtotal-nitrogeninstrainedrumenliquor	2
13.	Countingofprotozoaandbacteriainrumenliquor	2
14.	Demonstrationoffermentationoffeed-stuffinartificialrumen	1
	Total	**18**

SuggestedReading

- *Dukes'PhysiologyofDomesticAnimals*,13thEdn.WilliamOReece,Howard HErickson,JesseP Goff,EtsuroEUemura.2015.
- *Cunningham'sTextbookofVeterinaryPhysiology*5thEdn.BradleyG.Klein2012
- *DigestivePhysiologyandNutritionofRuminants*byDCChurch,1975
- *TheRumenMicrobial.Ecosystem*.2nd Edn.Ed.by.P.N.HOBSONandC.SStewart1997
- HungateRE.1966.*RumenanditsMicrobes*.Acad.Press.N.Y.
- *RumenMicrobiology*,BurkADehority.2003.NottinghamUniversityPress

CourseTitle :CardiovascularandRespiratoryPhysiologyCourseCode :VPY 602
CreditHours :2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	Functionalanatomyofheart	1
2.	Electrophysiologyofheart	1
3.	propertiesofcardiacmuscle	1
4.	Originandpropagationofcardiacimpulses	1
5.	Rhythmicexcitationofheart	1
6.	Cardiaccycle	1
7.	Cardiacsounds	1
8.	Cardiac outputandits measurements	1
9.	Factorsaffectingcardiacoutput	1
10.	Regulationofthecardiacfunctions	2
11.	Venousreturnandits regulation	1
12.	Normalelectrocardiogram	1
13.	Electrocardiographicinterpretationincommoncardiacdisorders.	1
14.	Cardiacmurmurs	1
15.	Cardiacarrhythmias	1
16.	Echocardiography	1
17.	Hemodynamics	1
18.	Bloodpressure-factorsaffectingitandmeasurement	1
19.	Regulationofbloodpressure	2
20.	Systemiccirculationandpulmonarycirculation	1
21.	Coronarycirculation	1
22.	Regionalcirculation	1
23.	Introductiontorespiration	1
24.	mechanismofventilation	1
25.	Pulmonaryvolumesandcapacities	1
26.	Transportandexchangeofrespiratoryoxygenatalveolarandtissuelevel	1
27.	Transportandexchangeofrespiratorycarbondioxideatalveolarandtissuelevel	1
28.	Neuralandchemicalcontrolofrespiration	2
29.	Respiratoryadjustmentsathighaltitude	1

30.	Respiratoryadjustmentstostress	1
31.	Respiratoryadjustmentstoexercise	1
32.	Respirationinbirds	2
	Total	**36**

Practical

Sr.No.	Topic	No. ofPracticals
1.	Determinationand recordingofcardiacoutput	1
2.	Measurementof bloodpressureby sphygmomanometer	1
3.	Recordingofheart rateby physiograph	1
4.	Effectofvariousionsandelectrolyteson heart	1
5.	Effectofhormonesonheart	1
6.	Effectoftemperatureon heart	1
7.	Recordingandinterpretationofnormal ECG	2
8.	Recordingandinterpretationofcardiacdisordersby ECG	2
9.	Determinationofbloodvolume	1
10.	Effectofexerciseonheart rate,pulseraterate	1
11.	Estimationofcardiacmarkerenzymes	1
12.	Determinationoflungvolumesandcapacitiesbyspirometry	1
13.	Estimationof bloodgases	1
14.	Estimationof bloodpyruvate	1
15.	Estimationof bloodlactate	1
16.	Effectofexerciseonrespirationrate	1
	Total	**18**

SuggestedReading

- GuytonandHall*TextbookofMedicalPhysiology*13thEdnJohnE.HallPh.D.2015
- *Ganong's Review of Medical Physiology*, 26th EdnKim E. Barrett, Susan M.Barman,ScottBoitano,Heddwen Brooks,2019
- *Dukes'PhysiologyofDomesticAnimals*,13thEdn.WilliamO.Reece,HowardH.Erickson, JesseP.Goff,EtsuroE.Uemura2015.

- *Cunningham'sTextbookofVeterinaryPhysiology*5thEdn.BradleyG.Klein2012

CourseTitle :RenalPhysiologyandBodyFluidDynamicsCourseCode :VPY 603
CreditHours :2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	Introductiontophysiologyofmammaliankidney	1
2.	TheoriesofrenalformationandFunctionalanatomyofkidney	1
3.	Renalhomeostaticfunction	1
4.	RenalcirculationandPressuresinrenalfunction	1
5.	Glomerularfiltration	1
6.	Solutereabsorption	1
7.	Tubularsecretion	1
8.	Waterexcretion	1
9.	Absorbtivecapabilitiesofdifferentsegmentsofnephron	1
10.	Renalmechanismforconcentrationofurine	1
11.	Renalmechanismfordilutionofurine	1

12.	AutoregulationofrenalbloodflowandGFR	1
13.	Renalfunctiontests	1

14.	Hormonalregulationofkidneyfunction	1
15.	Characteristicsofurineindifferentspecies	1
16.	Renin-angiotensin-aldosteronesystem	1
17.	Micturition	1
18.	Nonexcretoryfunctionsofkidney	2
19.	Acidsandbasesinthebody	1
20.	Buffersinthebody	1
21.	Roleofbuffersinacidbasebalance	1
22.	Disturbancesinacidbasebalance	1
23.	Urineformationinbirds	1
24.	Characteristicsofavianurine	1
25.	Bodyfluidcompartments	1
26.	RegulationofECFosmolalityandvolume	1
27.	RegulationofECFelectrolytes	1
28.	Waterbalance	1
29.	Measurementofbodywater	1
30.	Waterlossfromroutesotherthankidney	1
31.	Waterconservationindomesticanimals	1
32.	Diuretics	1
33.	Determiningthedegreeofdehydrationinananimal	1
34.	Fluidtherapy	2
	Total	**36**

Practical

Sr.No.	Topic	No. ofPracticals
1.	Collectionandpreservationofurine	1
2.	Qualitativeanalysisofphysiologicalconstituentsofurine	1
3.	Qualitativeanalysisofpathologicalconstituentsofurine	1
4.	QuantitativeanalysisofBUNinbloodandurine	1
5.	Quantitativeanalysisofcreatinineinbloodandurine	2
6.	Quantitativeanalysisofphosphateandglucoseinbloodandurine	2
7.	Determinationofsodium,potassiuminserum	1
8.	Determinationofcalciumandchlorideinserum	1
9-16.	Demonstrationofvariouskidneyfunctiontests-glomerularfiltrationrate,creatinineclearancerate,ureaclearancerateandglucose tolerancetest.	8
	Total	**18**

SuggestedReading

- GuytonandHall*TextbookofMedicalPhysiology*13thEdnJohnEHallPh.D.2015
- *Ganong's Review of Medical Physiology*, 26thEdnKim E Barrett,Susan MBarman,ScottBoitano,Heddwen Brooks. 2019.
- *Dukes'PhysiologyofDomesticAnimals*,13thEdn.WilliamOReece,HowardHErickson, Jesse PGoff,EtsuroEUemura.2015.
- *Cunningham'sTextbookofVeterinaryPhysiology*5thEdn.BradleyGKlein.2012.
- KlaharS.1983.*TheKidneyandBodyFluidsinHealthandDiseases*.PlenumPress.

CourseTitle **:Hematology**

CourseCode **:VPY604Cre**

ditHours **:2+1**

Theory

Sr.No.	Topic	No. ofLectures
1.	Haematology-blood-composition-solutesofblood-plasma-interstitialfluid-lymph	2
2.	Functionsofblood-generalcharacteristicsofblood-haematocrit-ESR-viscosity-temperature-volume-pH-colour-lifespan	1
3.	Haematocrit-methodsofdetermination-colourindex-icterusindex-bloodvolume-methodsofdetermination	2
4.	Plasmaproteins–fractions-electrophoreticseparation-generalfunctions	1
5.	Functionsofprealbumin-albumin-globulinsanditsfractions-	1
6.	Haematopoiesis-multipotentstemcells-definition-organsofhematopoisis-redandyellowmarrow	1
7.	Multipotentlymphoidandmyeloidstemcells-differentiationandmaturation	1
8.	Bonemarrowmicroenvironmentforhaematopoiesis-stagesoferythropoiesis	1
9.	Erythropoiesis-itsregulation-vitaminsanderythropoietin-haematinics	1
10.	Haemoglobin-stagesofHbsynthesis-regulation	1
11.	TypesofHb	1
12.	Ironmetabolism-Ferequirement-hepcidin	1
13.	Intravascularandextravascularhaemolysis	1
14.	CatabolismofHb	1
15.	Plasmabilirubin-types-hyperbilirubinemia	1
16.	Jaundice-types-etiology-differentialdiagnosis	1
17.	Anisocytosis-poikilocytosis-RBCmembranestructure-compositionofRBCmembrane	1
18.	RBCmetabolism-physiologicalandpathologicalconditionsassociatedwithpolycythemiaandoligocythemia	1
19.	Anemias-classification-defectiveformation-excessivedestruction-abnormalheme-abnormalglobinchains-causes	1
20.	Erythrocyteindices-cytometricclassificationofanemias-causes-Redcelldistributionwidth	1
21.	Leucocytopoiesis-granulocytopoiesis-lymphopoiesis	1
22.	Functionsofneutrophils-phagocytosis-opsonisation-eosinophils-basophils-monocytes	1
23.	Conditionsassociatedwithalterednumberofneutrophils,eosinophils,basophils,monocytesandlymphocytes	1
24.	Hemostasis-bloodfluiditymaintenance-injuryleadingtoprimaryhemostaticplugformation	1
25.	Secondaryhemostaticpathways-intrinsicandextrinsicpathways-regulation-stabilisationofclot	1

26.	Fibrinolysis-retractionofclot-haemostaticdisorders	1
27.	Typesofimmunity-innate-acquired-typesofacquiredimmunity-Passiveimmunity-types-antibody-mechanismofactionsofAb-	2

28.	NKcells-functions-T-celllymphocytopoiesis-thymus-functions-thymosin-thymopoietin-maturationofTcells-Tcellreceptors-blood Thymusbarrier	2
29.	FormationofThelper,cytotoxicandregulatorycells	1
30.	Plasmacells-structure–formationandfunctions	1
31.	Bloodgroupantigens-crossreactivity-transfusionimmunology	1
32.	Rhbloodgroup-erythroblastosisfoetalis-treatment	1
	Total	**36**

Practical

Sr.No.	Topic	No. ofPracticals
1.	EnumerationofWBC	1
2.	Enumerationofplatelets	1
3.	EnumerationofRBC/reticulocytes	1
4.	Enumerationofdifferentialleucocytes	1
5.	Specialstainingtechniquesforleucocytes	1
6.	Haemogrambyautomatedbloodcellcounter	1
7.	Anemicblood:Hb,PCV	2
8.	Icterusindexcalculationusingplasmaandstandard	1
9.	Colourindexcalculationusingplasmaandstandard	1
10.	Bandcellcountandarnethcount	1
11.	BloodviscosityandRBCfragilitydetermination	1
12.	Activatedpartialthromboplastintime	1
13.	Prothrombintime	1
14.	Avianblood:haemogram-I(erythrocyterelatesparametersusingspecialstain)	1
15.	Avianblood-haemogram-II(leucocyterelatesparametersusingspecialstain)	1
16.	Preparationofbloodcellsforelectronmicroscopicanalysis	2
	Total	**18**

SuggestedReading

- JainNC.1993.*EssentialsofVeterinaryHematology.*LeaandFebiger.
- *Schalm'sVeterinaryHematology*6thEd-DWeissJWardrop,Wiley-Blackwell.2010.
- *GuytonandHallTextbookofMedicalPhysiology*13thEdnJohnEHallPh.D.2015.
- *Cunningham'sTextbookofVeterinaryPhysiology*5thEdn.BradleyGKlein.2012.
- *Dukes' Physiology of Domestic Animals*, 13th Edn. William O Reece, HowardHErickson,JesseP Goff,EtsuroEUemura. 2015.

CourseTitle :GrowthandEnvironmentalPhysiologyCourseCode :VPY 605

CreditHours :2+0

Theory

Sr.No.	Topic	No. ofLectures
1.	Growth-Definition,concepts,terminologiesusedinexpressionofgrowth	1
2.	Hormonalregulationofgrowth	2
3.	Commercialandsynthetichormonesusedingrowthregulation	1
4.	Growthpromotersusedinlivestock	1
5.	Growthpromotersusedinpoultry	1
6.	Minerals-Introduction,Classification,sources	2
7.	Bioavailabilityofdifferentminerals	1
8.	Physiologicalroleofminerals	1
9.	Disordersofmineralmetabolisminlivestock	1
10.	Disordersofmineralmetabolisminpoultry	1
11.	Chelatedminerals	1
12.	Nanotechnologyinmineralsupplementation	1
13.	Effectofweathervariablesonreproduction	1
14.	Vitamins-Introduction,Classification,sources	1
15.	Physiologicalroleoffatsolublevitamins	1
16.	Physiologicalroleofwatersolublevitamins	1
17.	Disordersoffatsolublevitamins	1
18.	Disordersofwatersolublevitamins	1
19.	Syntheticvitaminsinanimalproduction	1
20.	Environment-Introduction,physicalcomponents	1
21.	Physicalprinciplesofheatexchange	1
22.	Weatherandclimate	1
23.	Homeothermy,Poikilothermy,endothermyandectothrmy	1
24.	Hibernationandestivation	1
25.	Bodytemperatureindifferentspecies	2
26.	Thermoregulationinlivestock	2
27.	Thermoregulationinpoultry	1
28.	Thermalstress	1
29.	Heattolerancecoefficient	2
30.	Effectofweathervariablesonproduction-Milk,meat,wool	2
	Total	**36**

CourseTitle : PhysiologyofAnimal ReproductionCourseCode :VPY 606

CreditHours :2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	Functionalhistomorphologyofmalereproductivesystem	1
2.	Functionalhistomorphologyoffemalereproductivesystem	1

3.	Developmentofmalesexorgansindifferentdomesticanimals	1
4.	Developmentoffemalesexorgansindifferentdomesticanimals	1
5.	Neuro-endocrinereflexes	1
6.	Pubertyanditsendocrinecontrolinmaledomesticanimals	1
7.	Pubertyanditsendocrinecontrolinfemaledomesticanimals	1
8.	Sexualcyclesinfemales	1
9.	Matingbehaviourinfemales	1
10.	Oogenesis	1
11.	Folliculogenesis	1
12.	Ovulation	1
13.	Secretionsoffemalereproductivetractindifferentspeciesof Animals	1
14.	Endocrineregulationoffemalereproductionindifferentspeciesof Animals	2
15.	Spermatogenesis	1
16.	Spermiogenesis	1
17.	Spermatogeniccycles	1
18.	Spermatozoa-structureandcomposition	1
19.	Spermatozoa-maturationandtransportation	1
20.	Secretionsofmalereproductivetract.	1
21.	Endocrineregulationofmalereproductionindifferentspeciesof Animals	2
22.	Transportofmaleandfemalegametes	1
23.	Fertilization	1
24.	Implantation	1
25.	Earlyembryodevelopment	1
26.	Maternalrecognitionofpregnancy	1
27.	Hormonesofpregnancy	1
28.	Placentation	1
29.	Gestation	1
30.	ParturitionandUterineInvolution	2
31.	Post-partumrecoveryindifferentspeciesofdomesticanimals	1
32.	Avianreproductionandformationofegg	2
	Total	**36**

Practical

Sr.No.	Topic	No. ofPracticals
1.	Methodsofheatdetectionindifferentspeciesofdomesticanimals	1
2.	Palpationofreproductiveorgans	1
3.	Examinationoffernpatternincervicalmucus	1
4.	Semenevaluation–Gross	1
5.	Semenevaluation–Microscopical	1
6.	Semenevaluation–Biochemical	1
7.	Demonstrationofpreservationofsemen	1
8.	Isolationofdifferentfollicles	2
9.	Collectionofoocytesandtheirgrading	2
10.	Estimationofreproductivehormones	3
11.	Demonstrationofestrusbehaviour	1
12.	Demonstrationofmating	1

13.	Demonstrationofparturition	1
14.	Demonstrationofoviposition	1
	Total	**18**

SuggestedReading

- *ReproductioninFarmAnimals*,7thEdnESEHafez,BHafez.2013.
- *McDonald's Veterinary Endocrinology*, Pineda and Doley. Iowa State UniversityPress,Ames, 2003.
- *PhysiologyofReproductionandArtificialInsemination*,SalisburyGWandDemarkNL.WB Saunders,1978.
- *Dukes' Physiology of Domestic Animals*, 13th Edn. William O Reece, HowardHErickson,JesseP Goff,EtsuroEUemura. 2015.

CourseCode :ClinicalPhysiologyC

ourseTitle :VPY607

CreditHours :1+1

Theory

Sr.No.	Topic	No. ofLectures
1.	Introductionandbasicconceptsofunderstandingofalterationinsystemfunctions	1
2.	Relationshipofcardiovascular,renal,respiratorysystemsandliverinhealthydomesticanimalsandcompensatorymechanismsduring failure/disorderofoneorothersystems	2
3.	ClinicalHaematology	1
4.	Clinicalenzymology	2
5.	MetabolismofCarbohydrateinhealthanddiseaseof variousspeciesofdomesticanimalsandpoultry	1
6.	Metabolismofproteininhealthanddiseaseofvariousspeciesof domesticanimalsandpoultry	1
7.	Metabolismoflipidinhealthanddiseaseofvariousspeciesofdomestica nimalsandpoultry	1
8.	Metabolismofvitaminsinhealthanddiseaseofvariousspeciesofdomestican imalsandpoultry	1
9.	Metabolismofmineralsinhealthanddiseaseofvariousspeciesofdomestican imalsandpoultry	1
10.	Evaluationofcommonendocrinedisorders– pituitary,thyroid,parathyroid,pancreasindomesticanimals(withreference tospecies andprofile)	2
11.	Reproductivefunctionalterationsinmaleandfemaledomesticanim als duringstress-productive,environmental,nutrition	1
12.	ClinicalevaluationofGastrointestinaltractandspecialsenses	1
13.	Neuromusculardisordersandclinicalcorrelation	1
14.	Acidbaseandelectrolytebalance	1
15.	Biologicalfluidanalysis	1

	Total	**18**

Practical

Sr.No.	Topic	No. ofPracticals
1.	Hematologicalanalysisofclinicallyrecoveredanimals	2
2.	Liverfunctiontestsofclinicallyrecoveredanimals	2
3.	Electrocardiographyandinterpretationsofclinicallyrecoveredanimals	2
4.	Sphygmomanometryofclinicallyrecoveredanimals	1
5.	RespiratoryFunctiontestsofclinicallyrecoveredanimals	1
6.	Digestivefunctiontestsofclinicallyrecoveredanimals	1
7.	Renalfunctiontestsofclinicallyrecoveredanimals	1
8.	Estimationofserumenzymesrelatedtocardiovascularfunctionsofclinically recoveredanimals	2
9.	Estimationofserumenzymesrelatedtoliverfunctionsofclinicallyrecovere danimals	2
10.	Estimationofserumenzymesrelatedtokidneyfunctionsofclinicall y Recoveredanimals	1
11.	ClinicalExaminationofendocrinologydisorderanimalsBioassayofsteroidh ormonesofclinicallyrecoveredanima	1
12.	Physiographic study ofbody parametersof clinically recoveredanimals	2
	Total	**18**

CourseTitle :NeuromuscularPhysiology
CourseCode :VPY 608
CreditHours :2+0

Theory

Sr.No.	Topic	No.of Lectures
1.	Introduction,OrganisationofNervoussystem \	1
2.	Cellularcommunication-conceptofmembranepotential	1
3.	Synapseanditsproperties,Synaptictransmission	2
4.	Neurotransmitters	1
5.	SensorysystemsandReceptors	2
6.	PainPhysiology	1
7.	Cerebralcortex–AnatomyandPhysiology	1
8.	Interbrain,thalamusandhypothalamus	1
9.	Midbrain–Physiologicalcapability	1
10.	Brainstem–Physiologicalanatomy	1
11.	SleepandEEG	1
12.	Memoryanditstypes	1
13.	Ponsandmedulla–AnatomyandPhysiology	2
14.	Cerebellum–AnatomyandPhysiology	1

15.	Spinalcord-AnatomyandPhysiology	1
16.	Spinalreflexesandproperties	1
17.	Posturalreflexes	1

18.	Peripheralnervoussystem	1
19.	Autonomicnervoussystem–Sympatheticnervoussystem	1
20.	Autonomicnervoussystem–Parasympatheticnervoussystem	1
21.	Entericnervoussystem	1
22.	Overallmotorcontrol	1
23.	SensoryPhysiology–Photoreception	1
24.	SensoryPhysiology–Auditoryandequilibriummaintenance	1
25.	Sensorytransduction–Gustationandolfaction	1
26.	Musclestructureandtypes	1
27.	Physiologicalpropertiesofmuscle	1
28.	Mechanismofmusclecontraction	1
29.	Propertiesofmusclecontraction	1
30.	Musclemetabolism	1
31.	AnatomyofNeuromuscularjunction	1
32.	Smoothmusclephysiology	2
	Total	**36**

CourseTitle :EndocrinologyofDomesticAnimalsC
ourseCode :VPY 609
CreditHours :2+0

Theory

Sr.No.	Topic	No.of Lectures
1.	Introductiontobioregulation -Scientificmethods, Controlledexperimentaltesting, Representativesampling,Doseresponserelationship,BiologicalRhythm,Endocrine–Nervous-Immunesysteminteraction	1
2.	Methodsofendocrinesecretionanalysis -Extirpation-observation:Replacement–observation, Imaging,Radioimmunoassay, Enzymeimmunoassay, HighPerformanceLiquidChromatography/spectroscopy, Immunohistochemistry Bioassays,Techniquesfordeterminingthenumberandcharacteristicsofhormonereceptor	2
3.	Disruptionofbiorhythmsinhomeostaticandnaturalecosystem -Endocrinedisruptorsormodulators, Assessment of endocrinedisruptor activity, Sources of endocrine disruptors, Xenobiotics,Environmentalpollutantsalteringendocrinesecretions	2
4.	Conceptsinhormonefunction -MorphologicalfunctionsBiologicalfunctions,Physiological functions,Molecularfunctions	1
5.	Mechanismofhormonesynthesisof - Proteinhormones,Steroidhormones,Eicosanoids,Thyroidhormones,Monoamines	2

6.	ReleaseandtransportinbloodMechanismsforregulatingrelease - InresponsetoTrophichormone,InresponsetoNervousstimuli(environ mentalcues) Inresponsetolevelsofvariousmetabolites, -Transport Carrierproteins,Halflife,Controlofhormonerelease,Pulsatile	2

	release,Sustainedrelease,Feedbackmechanism	
7.	MechanismsofhormoneactionExtracellularreceptors - Gproteincoupledreceptors,Catalyticreceptors,Intracellularreceptors, -cytoplasmic,intranuclear, Targetcellinteractions,-Upregulation,Downregulation	2
8.	Genomicapproachesinendocrinology. - Useoftransgeneicanimals,Knockoutanimals,Proteomics,Twodimensionalgelelectrophoresis,Xraycrystallography,Tomography,MRI	2
9.	Animalmodelstostudyendocrinedisorder -Wholeanimalmodel,Isolatedorgansortissues,*Invitro*models	2
10.	Hypothalamic,hypophysealhormones Structure,functionrelationshipofpituitaryandhypothalamusAnteriorpituitaryhormones **Growthhormone-** structure,production,biologicalfunctions,disordersofgrowthhormoneproduction **Prolactin-** structure,production,biologicalfunctions,disordersofgrowthhormoneproduction **ACTH-**structure,production,biologicafunctions **FSH-**structure,production,biologicalfunctions **LH-** structure,production,biologicalfunctionsPosteriorpituitaryhormones **Oxytocin-**structure,production,biologicalfunctions **Vasopressin-**structure,production,biologicalfunctions **Hypothalamicreleasingandreleaseinhibitinghormones** Growth hormoneinhibitinghormoneGonadotropinreleasing hormone	2
11.	Thyroidhormones -Transport, Receptors, Metabolism, Metabolic effects, Effectongrowth,development,fertilityandmilkproduction	2
12.	Adrenalhormones - Structureofadrenalandsynthesisofcorticalhormones,PhysiologicalrolesofGlucocorticoids,Mineralocorticoids, Physiologicalroleofmedullaryhormones	2
13.	Pinealglandanditsroleinproduction. -Melatonin,Photoperiodism,Seasonalbreeding,Manipulationofbreedingcycle,Implants,Sustainedreleasebolus	1
14.	Endocrinecontrolofcarbohydratehomeostasis - Insulin,Glucagon,Epinephrine,Growthhormone,Glucocorticoids,Thyroxine	2
15.	Endocrinecontrolofcalciumhomeostasis -Parathyroidhormone, Calcitonin, Calcitriol(VitaminD3),Estrogens/Androgens,Glucocorticoids,Thyroidhormones,Insulinlikegrowthfactors	2
16.	Hormonalregulationofgastro-intestinalactivity - Gastrin,Secretin,Gastrinreleasingpeptide,Cholecystokinin,Gastricinhibitorypeptideothers	1

17.	Prostaglandins-Synthesis,types,releaseandmodeofaction	1
18.	Hormonesinfertilityregulation -Manipulationofreproduction,Regulationandmanipulationofoestrous cycle, Use of hormone agonists to control fertility, Detectionandsynchronizationofoestrus Methodsfordetectionoestrus,Strategies for synchronizing oestrus, Prostaglandin $F_{2\alpha}$ based systems,	3

	Progestinandotherhormonesbasedsystems, Superovulation and embryo transfer, *In-vitro*productionofembryos,Recognitionandmaintenanceofpregnancy, Inductionofabortion/parturition,Advancingcyclicityinseasonalbreeders,andpubertyin animals,Immunologicalmanipulationofreproduction	
19.	Hormonesinproductionaugmentation -Somatotrophin, Adipokines, Leptin, Anabolic steroids and Analogues – mechanism of action delivery systems and safety aspects,AdrenergicAgonists–mechanismofactiondeliverysystemsand safety aspects ,Dietarysupplements, chromium, PUFA and CLA, Regulationoffeedintake,Orexigenichypothalamicneurohormones,Anorexigenichypothalamicneuropepetides,Hormonalregulationofmammaryglandand developmentandmilk,secretionArtificialinductionoflactation	2
20.	Avianendocrinology - Reproductivehormones,Hormonalmanipulationofeggproduction,Controlofbroodinessinpoultry,Manipulationofmoulting	2
	Total	**36**

SuggestedReading

- *GuytonandHallTextbookofMedicalPhysiology*13thEdnJohnEHallPh.D.2015.
- *Ganong's Review of Medical Physiology*, 26th EdnKim E Barrett ,Susan MBarman,Scott Boitano,Heddwen Brooks,2019.
- *Dukes'PhysiologyofDomesticAnimals*,13thEdn.WilliamOReece,HowardHErickson, Jesse PGoff,EtsuroEUemura.2015.
- *Cunningham'sTextbookofVeterinaryPhysiology*5thEdn.BradleyG.Klein.2012.
- *FundamentalsofNeurophysiology*.SmithRFSpringerVerlag.1978.

CourseTitle:InstrumentationandResearch TechniquesinVeterinaryPhysiology

CourseCode :VPY610C

reditHours :0+2

Theory

Sr.No.	Topic	No. ofPracticals
1.	Designandtypesofresearchlaboratory	1
2.	Maintenanceofresearchequipments	1
3.	Impartingknowledgeaboutpreparationofvarioussolutions	2
4.	BasicprinciplesandconceptsofpH	1
5.	DeterminationofpHofvarioussolutionsandbiologicalsamples	1
6.	BasicprinciplesandconceptsofECG	1
7.	RecordingofECGinanimals	1
8.	Basicprinciplesandconceptsofphysiographanditsaccessoriesfor *in-vitro*livetissueexperiments	1
9.	Recordingofbloodpressurebyphysiographandsphygmomanometer	1
10.	Recordingofpulseratebyphysiograph	1
11.	Recordingofrespiratoryvolumesbyspirometer	1
12.	Neuromuscularexperimentalphysiologyusingphysiograph	1

15.	Proteinseparationandisolationmethods–basicconcepts	1
16.	Methodsofproteindetermination	2
17.	Electrophoresis	1
18.	Thinlayerchromatography	1
19.	Gasliquidchromatography	1
20.	Basicconceptsofmineralestimation	1
21.	Flamephotometry	1
22.	Lawsofcolorimetry	1
23.	Spectrophotometry	1
24.	Organbath–Applicationsinexperimentalphysiology	1
25.	Experimentsusingorganbath	1
26.	Enumerationofruminalmicroflora	2
27.	EstimationofVFA	1
28.	Estimationofammonianitrogen	1
29.	Estimationofbodywater	1
30.	*In-vitro*rumenstudies	1
31.	ELISAforestimationofvarioushormones	2
32.	RIAforestimationofvarioushormones	1
	Total	**36**

SuggestedReading

- *Hawk'sPhysiologicalChemistry*.OserBLTataMcGraw-Hill.1976.
- *Varley'sPracticalClinicalBiochemistry*AlanHGowenlock
- *HandbookofRadioimmunoassay*.AbrahamGEMarcelDekker.1977.
- *Electrocardiograms:ASystematicMethodofReadingThem*ArmstrongML.1978
- *RumenMicrobiology*,BurkADehority2003NottinghamUniversityPress

CourseTitle :Physiology of Wild
LifeCourseCode :VPY 611
CreditHours

:1+0

Theory

Sr.No.	Topic	No.of Lectures
1.	AnimalSpeciesOverviewofIndianforests.	1
2.	Howtoidentifythesexofwildanimalsandbirds.	1
3.	CollectionofClinicalmaterialsforlaboratoryexamination;methods	2
4.	Heamtology	1
5.	Commonclinicalbiochemicalestimations.	2
6.	Methodsofmeasuringbodytemperatureofwildanimals	1
7.	Measuringcaptureandimmobilizationstressinwildlife \	1
8.	Measuringsenescenceinwildanimalpopulations	1
9.	Reproductionmanagementinwildanimals	2
10.	Understandingsoundmechanicsandcommunicationmethods	1
11.	Wildanimalethology	2
12.	Governmentpoliciesforwildlifeprotection(respectivestate)	1
13.	Lecturebywildlifevetorconservationist	2
	Total	**18**

SuggestedReading

StandardtextbooksandGovernmentpoliciespertainingtowildlife.

CourseContents

Ph.D.inVeterinaryPhysiology

CourseTitle :AppliedPhysiologyofBodyFluidsandElectrolytesCourseCode :VPY 701
CreditHours :2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	Bodyfluidcompartments-ExtracellularandIntracellularfluid compartment(ECFandICF),VolumeofECFand ICF.Compositionofvariousbody fluids	2
2.	TotalBodywater,Waterrequirement,dailyintakeandlossofwater Fromthebody	1
3.	Differenttransportmechanismsforexchangeofwaterandelectrolytes-Activeandpassivetransport,filtration,diffusionandosmosisExchangeofnutrientsandothersubstancesbetweenbloodandinterstitialfluid.	1
4.	Capillarypressure, interstitial fluid pressure, exchangeof fluids throughcapillarymembrane	1
5.	Principlesofosmosisandosmoticpressure,osmoticequilibriumbetween ICFandECF,TonicityofbodyfIuids	1
6.	CompositionofsynovialfluidandperitonealfIuid	1
7.	OsmolarityandOsmolalityofICFandECF,regulationofvolumeandosmolarityofECF	1
8.	Contributionofdifferentmoleculesvizglucose,sodiumandureatowards osmolarityofECF	1
9.	pHofdifferentbodyfluids,factorsaffectingpHofbodyfluids,Physiologyofacidbasebalance,buffersystemsofICFandECF	1
10.	DifferenttypesofAcidosisandAlkalosis,theiretiologyandcompensation	1
11.	Evaluationofacid–basestatus-Siggaard–Andersenalignmentnomogram,Aniongap,baseexcessanddeficit	1
12.	RoleofRespiratorysystemandKidneys inmaintenanceofAcidbasebalance	1
13.	FormationandcompositionofCerebrospinalfluidandlymph	1
14.	Clinicaldisordersresultingintolossofelectrolytesfrombodyfluids.	1
15.	Changesinplasmavolumeanditscompositionunderdifferentclinical conditions-vomitionanddiarrhoea	1
16.	hypervolemiaandhypovolemia,Implicationsofhypovolemicandhemorrhagicshock	2
17.	Dehydration-itstypesandcauses.Waterintoxication	1
18.	Roleofkidneysinregulationofwaterbalance.Renin-angiotensinsystem	1

19.	Roleofkidneysinformationandexcretionof concentratedanddilutedurine	1
20.	Hormonalregulationofimportantelectrolytesinplasma	1

21.	RoleofHormonesinrenalregulationofwaterandelectrolytes	1
22.	Diuresisandpressurenatriuresis,polyuriaandoligouria	1
23.	Clinicalconsiderationsinfluidandelectrolyteimbalances	2
24.	Clinicopatholiogicalindicatorsoffluidandelectrolyteimbalance	1
25.	ClinicalPhysiologyofDehydration– Signs,symptoms,evaluationofintensityofdehydration	1
26.	ClinicalPhysiologyofvomitionanddiarrhoea-Signsandsymptoms	1
27.	ClinicalPhysiologyofedemaSignsandsymptoms,causesandprevention	1
28.	Roleofserumsodium,hyponatremia,hypernatremia;Roleofserum potassium,hypokalemia,hyperkalemia	1
29.	Roleofserumchloride, hypocholeremiaandhypercholeremia, bicarbonateions	1
30.	Principleandindicationsoffluidtherapy	2
31.	Typesofsolutionusedforfluidtherapy,roleoftheircomponentsand theiruseindifferentclinicalconditions	1
32.	Effectofaddingdifferentsaline,glucosesolutionstoECF-isotonic,hypertonicandhypotonicsolutions	1
	Total	**36**

Practical

Sr.No.	**Topic**	**No. ofPractic als**
1.	EstimationofpHofdifferentbodyfluidsandevaluationofacidbasestatus.	1
2.	Determinationofsodiuminserumsampleoffarmanimals(byflame photometry/colorimetricmethod)	1
3.	Determinationofpotassiuminserumsampleoffarm animals(byflamephotometry/colorimetricmethod)	1
4.	Determinationofchlorideinserumsampleof farmanimals(byflamephotometry/colorimetricmethod)	1
5.	Determinationofbicarbonateinserumsampleoffarmanimals	1
6.	DeterminationofCalciuminserumsampleoffarmanimals	1
7.	DeterminationofMagnesiuminserumsampleoffarmanimals	2
8.	Determinationofphosphateinserumsampleoffarmanimals	1
9.	Determinationoftotalbodywater(simulateddemonstration)	1
10.	Determinationofbloodvolume(simulateddemonstration)	1
11.	Determinationofplasmavolume(simulateddemonstration)	1
12.	DeterminationofInterstitialFluidVolume(simulateddem onstration)	1
13.	Estimationofosmolarityandosmolalityofurineoffarmanimal s	2
14.	Estimationofosmolarityandosmolalityofmilk	1
15.	Estimationofosmolarityandosmolalityofbloodoffarmanimals	1
16.	Evaluationofdehydrationinanimalandchoosingthefluidtype,its volumeandrateforfluidtherapy	1
	Total	**18**

CourseTitle :PhysiologyofAnimalBehaviourCourseCode :VPY 702
CreditHours :2+0

Theory

Sr.No.	Topic	No. ofLectures
1.	IntroductiontoethologyanditsimportanceinVeterinaryScience.	1
2.	Ethology-definitionanditsimportanceinanimalwelfare	1
3.	Typesofanimalbehaviour	2
4.	BehaviouralEcology,evolutionarybasisforanimalbehavior	2
5.	Ecologicalpressures,ontogenyandphylogenyofbehaviour	1
6.	Physiologicalconceptofbehaviour,neuro-endocrineintegrationforbehaviouralmanifestation	2
7.	The concept of instinct, Habituation, imprinting, reinforcement,conditioning,reasoningandintelligence.Temperament scoring	2
8.	Ingestive/feedingbehaviourinruminants:Prehension,grazingbehaviourincattle,sheepandgoats,rumination behaviour	2
9.	Ingestivebehaviourindogs	1
10.	Ingestivebehaviourinswine	1
11.	Specialfeedingpatterns;Abnormalfeedingbehaviour	2
12.	Precopulatorybehavior(Searching,Courtship,Sexualarousal,Erection,Penileprotrusion):Speciesdifferentiation	2
13.	Copulatorybehaviour(Mounting,intromissionandejaculation):Speciesdifferentiation	2
14.	Postcopulatorybehaviour(Dismountingandrefractoryperiod)	1
15.	Manifestationofbehaviouralestrus,estrusintensityscoring	2
16.	Roleofpheromoninsexualbehaviourmanifestation	1
17.	Abnormalsexualbehaviouralpattern	1
18.	Maternalbehaviour:Formationofbondbetweenmotherandfetus,conceptofcriticalperiod,vocalization	1
19.	Maternalbehaviourindifferentspecies,abnormalmaternalbehaviour	2
20.	Milkingbehaviour:Milkingtemperament,milkletdownreflexandthefactorsaffectingmilkingbehaviour	2
21.	Socialbehaviour:Dominance,Socialhierarchy	1
22.	Agonistic(combatoraggressive)behaviour,Gregarious,Peckorderinchicken	1
23.	Communicatingbehaviour:Attraction,RepulsionandSubmission	1
24.	Modeofcommunication(visual,auditory,chemical)indifferentspecies.	1
25.	Responsesofdogsandhorsestotraining	1
	Total	**36**

CourseTitle :AdvancesinRuminantDigestionCourseCode :VPY 703
CreditHours :2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	IntroductiontoethologyanditsimportanceinVeterinaryScience.	1
2.	Functionaldevelopmentofruminantstomach	1
3.	Microbialecosystemoffermentativedigestion	1
4.	Fluctuationinrumenmicrobialpopulation	1
5.	Substratesforfermentativedigestion	1
6.	Salivarysecretionanditsregulation	1
7.	Roleofsalivaonfermentativedigestion	1
8.	Rumenmotilityanditsregulation	1
9.	Rumenbacteria	2
10.	Rumenprotozoa–itsimportance anditsinteractionwith othergroup	2
11.	Anerobicfungi	1
12.	Polysaccharidedegradationbyrumenmicrobes	2
13.	Metabolismof nitrogencontaining compounds	1
14.	Lipidmetabolisminrumen	2
15.	Rumenmetabolitesandtheirassimilation	2
16.	Microbe-microbeinteraction	1
17.	Comparativeefficiencyofrumenfunctionindifferentspecies.	2
18.	Protectednutrients	2
19.	Digestivedisorders of rumen	1
20.	Nutritionaltoxicityand strategyto addressit	1
21.	Stoichiometryoffermentativedigestion	1
22.	Approachestomodificationofruminalfermentation	2
23.	Modifiersofruminalmicrobialactivity	1
24.	Biologicalmodelsofrumenfunction	2
25.	Rumensimulationtechnique	2
26.	Rumenflowrateandrumen volume	1
	Total	**36**

Practical

Sr.No.	Topic	No. ofPractic

		als
1.	Reticulo-ruminalmotility	2
2.	Totalvolatilefattyacidsandtheirfractions	2
3.	Cultureofrumenbacteria	3
4.	Protozoalcounting	2
5.	Cultureofrumenfungi	3
6.	Demonstrationofeffectofdefaunation	2
7.	Flowratesofruminalcontents	2
8.	Artificialrumentechniques	2
	Total	**18**

CourseTitle :AdvancesinNeuro-endocrinologyCourseCode:VPY 704
CreditHours :2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	Evolutionandtheoryofhormones	2
2.	Developmentofendocrineglands	1
3.	Neuroendocrineintegratingmechanism	1
4.	Homeostaticregulationbyhormones;Feedbackregulationofhormones	2
5.	Biorhythms,manipulationanddisruptionofbiorhythmsinhomeostatic andnaturalecosystem	1
6.	Hormonesandadaptationtoenvironment	1
7.	Endocrinemethodologiesinstudyofbioregulation	1
8.	Animalmodelsandalternateusesofanimalmodelinendocrinestudies	1
9.	Methodsofhormonalassays-Radioimmunoassay,Immunorediometricassay,Radioceptorsassay,enzymelinked immunosorbentassay,chemi-luminiscenceassay	2
10.	Hormonesecretion,transportandclearance	1
11.	Cellularreceptorsforhormone;Hormonesandtargetcells	1
12.	Genomicandnongenomiceffectsofhormones	1
13.	Secondmessengersystem;Receptorsignaltransduction;Hormonereceptorinteraction–proteinandpeptidehormones; Hormonereceptor interaction–steroidandotherhormones	2
14.	Half-lifeofhormones,patternofhormonerelease;Studies	1
15.	Typesandfamilyofhormones	1
16.	Hormonesregulatinggrowth	1
17.	Hormonesregulatingenergymetabolism	1
18.	Hormonesregulatingdigestion	2
19.	Hormonesregulatingcalciumandphosphorus	1
20.	Hormonesregulatingelectrolytes–NaandK	1

21.	Hormonesregulatinghyperandhypoglycemia	1
22.	Hormonesregulatingbloodvolumeandbloodpressure	1
23.	Alleviationofstressbyhormones	1
24.	Endocrineroleofpinealgland	1
25.	Hormonesandbehavior	1
26.	Endocrinepathophysiology	2
27.	Avianendocrinology	2
28.	Synthetichormones	1
29.	Applicationofnanotechnologyinendocrine	1
	Total	**36**

Practical

Sr.No.	**Topic**	**No. ofPracticals**
1.	Extractionofhormones	2
2.	Immunohistochemistryofhormones	2
3.	Radio-immunoassayofhormones	3
4.	Enzymelinkedimmunosorbentassayofhormones	2
5.	Bioassyofhormones	2
6.	Inductionofatherosclerosis	1
7.	Inductionofhypoglycemiainlaboratorymodelsbyallaxonandstreptozotocin	2
8.	Inductionofhyperglycemiainlaboratorymodelsbyadministrationofepinephrineandglucagon,etc.	1
9.	*In-vitro*effectsofcertainhormonessuchasadrenaline,histamineandacetylcholineonexcisedintestine	1
10.	Hormoneassayinfecalsamples	2
	Total	**18**

CourseTitle :MyophysiologyandKinesiologyC
ourseCode :VPY 705
CreditHours :2+0

Theory

Sr.No.	Topic	No. ofLectures
1.	Morphologyofmuscle	1
2.	Chemicalcompositionofmuscle	1
3.	Electricalphenomenaandironinfluxes	2
4.	Musclecontractionandirritability.	2
5.	Neuromusculartransmission	2
6.	Excitationcontractioncoupling	2
7.	Mechanicalpropertiesofskeletalmuscle	1
8.	Typesofchemicalmusclefibres	1
9.	Coordinationamongmuscles.	2
10.	Thermalpropertiesofmuscles.	2
11.	Chemicalcorrelatesofcontraction.	1
12.	Molecularbasisofmuscularcontractionofskeletalmuscle	2
13.	EnergeticsofMuscleContraction	2
14.	Electromyogram	2
15.	Pathophysiologyofmuscles	1
16.	Myocardium–electricalproperties	2
17.	Myocardium–mechanicalproperties	2
18.	Pacemakertissue	1
19.	Enduranceofmuscle	1
20.	Leversystemsofbodyjoints,	2
21.	Synovialfluidformationanditsphysiology.	2
22.	PrinciplesofKinesiologyanditsapplicationinworkphysiology	2
	Total	**36**

CourseTitle :Avian PhysiologyCourseCode :VPY 706
CreditHours :2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	DigestiveSystem,Comparativefunctionalanatomyofthedigestivetract-Gastrointestinalfunction	1
2.	Foodintakeregulation,GImotility,neuralandhormonalcontrolofmotility	1
3.	SecretionsandDigestion	1
4.	Absorption-Carbohydrates,AminoAcidsandPeptides,FattyAcidsandBileAcids,VolatileFattyAcids	2
5.	Urinarysystem-Functionalanatomyofthekidneys-intakeofwaterandsolutes	1
6.	Formationofurine-osmoregulation	1
7.	Post-renalmodificationofureteralurine	1
8.	Saltglands-Evaporativewaterloss	1
9.	Blood,Cardiovascularbloodcomponents–EffectsofAltitude	2
10.	GrossStructureandFunction	1
11.	GeneralCirculatoryHemodynamics	1
12.	ControloftheCardiovascularSystem	2
13.	IntegrativeNeuralControl	1
14.	RespiratorysystemAnatomyoftheAvianRespiratorySystem-AirSacs	1
15.	VentilatoryReflexes-RespiratorySystemVolumes	1
16.	GasExchange-VentilationandRespiratoryMechanics	1
17.	BasicPrinciplesofOxygenTransport-Cross-CurrentGas Exchang	1
18.	High-AltitudeFlight-ControlofBreathing	1
19.	ReproductivesystemAnatomyoftheFemaleReproductive BreedingandOvulation–OvipositionCycles	1
20.	OvarianHormonesHormonalandPhysiologicFactorsAffecting Ovulation	1
21.	EffectofLightontheOvaryandOvulation,Photorefractoriness Molt	1
22.	IncubationPhysiology	1
23.	MaleReproductiveTractAnatomyHormonalControlofTesticular Function,SpermatogenesisExtragonadalSpermTransportandMaturation	1
24.	Endocrinesystem.Synthesis,ReleaseofHormonesandfunctions of endocrineglands	1
25.	HypothalamusandPituitaryHormones	1
26.	PancreaticandAdrenalhormones	1
27.	SecretionsofThyroidgland,parathyroidgland	1
28.	Nervoussystemandmusculo-skeletalsystemSensory Physiology-Uniquenessofavianbrain	1
29.	FunctionalOrganizationoftheSpinalCord	1
30.	TheAutonomicNervousSystemofAvianSpecies	1

31.	SkeletalMuscleMuscleFiberTypes,ElectricalPropertiesof MuscleFibers-ContractileProperties	2
32.	Neurotransmission,Smoothmuscle	1
	Total	**36**

Practical

Sr.No.	Topic	No. ofPracticals
1.	Collectionofbloodfromthebirdsandbloodprocessing	1
2.	StudyofbloodcellsRBCcount	2
3.	WBCcount	1
4.	DLC	2
5.	Thrombocytecount	1
6.	Haemoglobinconcentration	1
7.	Packedcellvolume(haematocrit)	1
8.	Erythrocytesedimentationrate	1
9.	Determinationoffeedpassagerateinbirds	1
10.	Enzymaticprofileundervariousphysiologicalstatesofbirds	1
11.	Collectionofsemenanditsevaluation	1
12.	Demonstrationofcoldshockresistantofavianspermatozoaandspermstimulatoryandinhibitoryagents	1
13.	Determinationofglucoseandcalciuminblood	1
14.	Determinationofuricacidandureainblood	1
15.	Electrophoreticseparationofplasmaproteinsandeggproteins	1
16.	Localizationofdifferentendocrineglands	1
	Total	**18**

CourseTitle :Physiology of Lactation
Course Code :VPY 707
Credit Hours :2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	Introductiontothemammaryglandandmilkproduction	1
2.	Mammaryglandanatomy-macrostructure	1
3.	Mammaryglandanatomy-microstructure	1
4.	Mammaryglandanatomy–bloodsupply,nervesupplyandlymphaticnetwork	1
5.	Comparativeanatomyandphysiologyofmammaryglandofdifferentdomesticanimals	2
6.	Basichistologyofparenchymaandcellularorganizationofthemammaryepithelialcell	1
7.	MammarygrowthanddevelopmentI:fetalthroughpuberty	2
8.	MammarygrowthanddevelopmentII:Post-pubertythroughinvolution	2
9.	Hormonalcontrolofmammogenesis	1
10.	Lactogenesis	1
11.	Lactation	2
12.	Biochemicalchangesinmammaryglandduringlactation	1
13.	Histologicalchangesinmammaryglandduringlactation	1
14.	Galactopoiesis	1
15.	Neuroendocrinecontroloflactation	1
16.	Milkletdownanditsinhibition	1
17.	Factorsaffectingmilkyield	2
18.	Dryperiod–importance,differentstrategiesandbeliefs	1
19.	Mammaryinvolution	1
20.	Milkpropertiesandcomposition	2
21.	Colostrum	1
22.	Milkcarbohydratesynthesisandsecretion	1
23.	Milkproteinsynthesisandsecretion	1
24.	Milklipidssynthesisandsecretion	1
25.	Mammaryglandimmunology	1
26.	Otherimportantmilkcomponents	1
27.	Contaminantsandpollutantsinmilk	2

28.	Manipulationofmilkproduction	1
29.	Diseasesassociatedwithmammarygland	1
	Total	**36**

Practical

Sr.No.	**Topic**	**No. ofPracticals**
1.	Externalstructureofcow'sudder	2
2.	Internalstructureofcow'sudder	2
3.	Histologicalexaminationofudderincows	1
4.	Milkletdownresponseindairyanimals	2
5.	Compositionofcolostrum	2
6.	Compositionofmilkduringdifferentphasesoflactation	2
7.	Artificialinductionoflactation	3
8.	Estimationoflactogenichormones	4
	Total	**18**

CourseTitle :Advances in Ecosystem, Environmental Physiology and GrowthCourseCode :VPY 708
CreditHours

:2+1

Theory

Sr.No.	Topic	No.of Lectures
1.	Ecologyanditsscopeinlivestockproductivity	1
2.	Disciplinesofecology;fundamentalprinciplesofecology	1
3.	Biosphereandbiodiversity	1
4.	EcosystemandComponentsofEcosystem;TypesofSpeciesFound inEcosystems;PrincipalWaysSpeciesInteract	2
5.	Adaptation,AcclimationandAcclimatization	2
6.	TemperatureRegulation-*ThermoregulatorsandThermoconformer*	1
7.	PrinciplesofHeatgainsandlossesinanimals	1
8.	Warm-bloodedversuscold-bloodedanimalsanditsrelevanceto Survival	1
9.	Heatproductioninbirdsandmammals	2
10.	Hibernation,EstivationandDailyTorpor;ColdHabitation	1
11.	BodyTemperatureofHomeotherms-conceptofcoretemperaturemeasurements-RectalTemperatureofdifferentanimalspecies; DiurnalVariations	1
12.	Physiologicalresponsestoheatinanimalsandbirds	1
13.	Temperatureregulationinbirds	1
14.	Bioclimatologywithrespecttolivestockandpoultryfarming	1
15.	Surfacetemperatureofearth-itsmeasurements	1
16.	Earth'satmosphere-GeographicBelts,Compositionofthe Atmosphere	1
17.	Climaticelements-components–measurements	2
18.	Coldstress,Heatstress-impactonanimalhealthandproduction	2
19.	Adaptationtoatmosphericpressuredifferences[altitude]-physiologicalchangesandphenotypiccharacters	1
20.	Physiologyofgrowthanditsmeasurements	1
21.	Periodsofgrowth-prenatalandpostnatal	2
22.	Patternofgrowth	1
23.	Factorsaffectinggrowth	1
24.	Recentconceptsinmanipulationofgrowth	1
25.	Growthpromoters	2
26.	Ethicalissuesinuseofgrowthpromoters	2
27.	Growthanomalies	1
28.	Ageingandsenescence	1
	Total	**36**

Practical

Sr.No.	Topic	No. ofPracticals
1.	Atmospheredefinition-understandingtheglobe	1
2.	TemperatureRecordinginanimalhouse,poultryhouse,andlaboratory	3
3.	CalculationofRH	1
4.	CalculationofTHI	1
5.	CalculationofHeatLoadingindex	1
6.	Measurementofsweatingrateincattle	2
7.	Stressassessment-differentmethodsandindicators	2
8.	WeatherforecastmodelsfollowedinIndia	1
9.	DateanalysisofrainandtemperaturefOr20yearsintherespectiveRegion	2
10.	Assessingimpactofdifferentshadesandhousesonmilkproduction inthecollegefarms	1
11.	Measurementsofgrowthrateandchartofcrossbredcalves,nativebreedcalf, etc.	1
12.	Visittometeorologystations	1
13.	PurposeandroleSatellitesofISROrelatedtothecourse(invitedle cture)	1
	Total	**18**

CourseTitle :CellularandMolecular PhysiologyCourseCode :PHY709
CreditHours

:2+0

Theory

Sr.No.	Topic	No. ofLectures
1.	Cell and itsorganelles– structure and function,differencebetweenprokaryoticandeukaryoticcell	2
2.	Structuralorganizationofbimembranes	2
3.	Transportofmoleculesthroughcellmembrane	1
4.	Membraneproteinsandtheirfunctions	1
5.	Celladhesionmoleculesandtheirfunctions	1
6.	Transmembranesignallingpathways	2
7.	Cellsignalingandapoptosis	2
8.	Modernmethodstostudysignaling	1
9.	Cellcycle-stages,mitosisandmeiosisandregulatorymolecules	4
10.	Organizationofeukaryoticandprokaryoticgenome	4
11.	DNAreplicationinprokaryotesandeukaryotes	4
12.	Transcriptioninprokaryotesandeukaryotes	2
13.	Translationinprokaryotesandeukaryotes	2
14.	Techniquesinmolecularbiology–PCR,DNAsequencing,DNAmicro-array,DNAfingerprintinginsituhybridization	4
15.	RecombinantDNAtechnologyanditsapplications	2
16.	GenesilencingbyRNAinterfacetechnology	2
	Total	**36**

CourseTitle :Advances inImmunoPhysiologyCourseCode:VPY 710
CreditHours

:2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	Typesofimmunity	1
2.	Hostcellreceptorsofinnateimmunity	1
3.	Passiveimmunity.	1
4.	Acutephasereactantproteins(APRs)– positiveAPRsandnegativeAPRs	1
5.	SignificanceofCRPs	1
6.	Antigen	1
7.	Factorsinfluencingimmunogenicityofantigens	1
8.	Heterophileantigens	1
9.	Antibody	1
10.	Functionsofimmunoglobulin	2
11.	Isotypes	1
12.	Hybridomas	1
13.	Monoclonalantibodies(mAB)	2
14.	Antigenantibodyreaction	1
15.	Neutralisation	1
16.	Westernblottingtechnique	1
17.	Complementpathways	1
18.	Leucocytopoiesis	1
19.	CentrallymphoidorgansI	1
20.	CentrallymphoidorgansII	1
21.	CharacteristicsandfunctionsofdifferentTandBlymphocytes	1
22.	NKcells	1
23.	Majorhistocompatibility	1
24.	Cytokines:interleukins,interferons,TNF,CSF	2
25.	Antigenpresentingcells	1
26.	Cellmediatedimmunity	1
27.	Humoral/Abmediatedimmunity	1
28.	Immediatetype	1
29.	HypersensitivitytypeIII–mechanism	1
30.	Autoimmunity	1
31.	Immunologicaltolerance	1
32.	Transplantimmunology	2
	Total	**36**

Practical

Sr.No.	Topic	No. ofPracticals
1.	Isolationoflymphocytesfrombloodbydensitygradientcentrifugation	2
2.	Determinationofliveanddeadlymphocytesintheseparatedsample	1
3.	EstimationofCRPinserumbyimmunoturbidimetricassay	1
4.	Hyperimmuneseumproduction	1
5.	Haemagglutinationtest	1
6.	Haemagglutinationinhibitionassay	1
7.	Immunoprecipitationtest	1
8.	Complementfixationtest	1
9.	ELISAmethodology	1
10.	ELISAdiagnostictest	1
11.	RIAmethodology	1
12.	RIAdiagnostictest	1
13.	Antibody-dependentcell-mediatedcytotoxicitymethodology	1
14.	Immunofluorescence-Immunohistochemistry	2
15.	Westernblottingmethodology	2
	Total	**18**

CourseTitle :PhysiologyofStressC
ourseCode :VPY 711
CreditHours

:2+0

Theory

Sr.No.	Topic	No. ofLectures
1.	DefinitionofStress,distressandeustress-ConceptofStressors-typesofstressors–Acuteandchronicstress-Broadmeasuresofstressinanimals–Behavioral,Physiologicalandmolecular measuresof stress	2
2.	Neuroendocrinologyofstressresponse-sympathetic-adrenal-medullary(SAM)pathway-thehypothalamic-pituitary-adrenal(HPA)axis	1
3.	Effectofstressonmusculoskeletalsystem–ExerciseandDraftassociated stress-Physiologicalassessmentandindicesforevaluatingworkload conceptofacceptableworkload.	1
4.	Effectsofstressonreproduction(includingbirds)–pregnancy,prenatalgrowth,lactationandEggproduction	2
5.	Effectofstressonlactation-Energypartitioninginlactatinganimalsunderstress-Physiologicalbasisofstrategiestocombatstressinlactatinganimals	1

6.	Effectofstressonimmunesystem–alteredcellularresponsesand	1
	cytokineproductionpatternsandtheirconsequences	
7.	EffectofStressonlearningandmemory–Areasofbrain associatedwithstressinducedalterationsinlearningandmemory	1
8.	Environmentalcharacteristicsaffectinganimals– Role ofTemperature,Humidity,wind,Rainfallandsolarradiationon animals	1
9.	ConceptofHomeothermyandThermalstressinanimals– ThermoneutralandThermocomfortZone–Upperandlowercritical temperature	1
10.	Thermalexchangesbetweenanimalandenvironment–Conduction, Convection,RadiationandEvaporation	1
11.	Physicalandbiologicalmeasuresofthermalstress– TemperatureHumidityIndex(THI),TheLivestockWeatherSafetyIndex (LWSI),Awindchillindex(WCI),Comprehensiveclimateindex(CCI),T unicaDartosIndex(TDI),Infra-redthermography(IRT) basedmeasures	2
12.	EffectofotherenvironmentalstressorslikeSolarUVradiation, highaltitude,pollutionrelatedstressors	1
13.	ConceptofAdaptation,Acclimatization,Acclimation-Typesand levelsofAdaptation	1
14.	Morphological,AnatomicalAdaptationofAnimalsandBirdsto variouskindsofenvironments– Theoriesassociatedwithsuchadaptations	1
15.	Physiologicaladaptationstoheatstress–circulatory,respiratory, endocrineadjustments–PantingandSweatinginanimals	1
16.	Physiologicaladaptationstocoldstress–circulatory,respiratory, endocrineadjustments–Thermogenesisincold– Tissuesassociatedwiththermogenesis	1
17.	CellularandMolecularadaptationstothermalstress–Heatshock response–Chaperonesandtheirroleinthermotolerance	1
18.	BehavioraladaptationstothermalstressinAnimalsandBirds -IndividualandGroupadaptationbehaviors	1
19.	SpecialadaptationstoExtremeenvironmentslikeDeserts,polar regions.Estivation,hibernationandtorpor	1
20.	Physiologyofthermalreceptionandprocessing– Centralandperipheralthermoreceptors–Fever,Hyperthermiaand Hypothermia	1
21.	OverviewofallthermaladaptationfeaturesinFarmanimals includingcamelanddonkeys,Yak	2
22.	Specialthermaladaptationfeaturesinbirds–Thermaladaptation duringflight	1
23.	Measuresofthermotoleranceinanimals– Rhoads,Gaala's,Benezra's,Iberianheattoleranceindicesandcoolingeffici encytest ofDowling	1
24.	AdaptationofanimalstoHighAltitudeStress–Pulmonary circulationchangesadjustmentsinblood– O_2affinitywithchangeinaltitude	1
25.	ConceptofGlobalwarmingandclimatechange–Approachesto alleviatetheadverseeffectsofclimatechangeinducedheatstress.	1
26.	Conceptofredoxbiology,oxidativeeustressandoxidativedistress– Historyofoxidativestressconcept	1

27.	KindsandformsofOxidativestress–Classificationofoxidative stress(Basal,lowintensity,intermediateintensityandhighintensity)	1
28.	ReactiveOxygenSpecies(ROS)andReactiveNitrogenSpecies (RNS)–DifferenttypesofROSandRNS–SourcesofROSandRNS generation–OxidativeandNitrosativedamage	1
29.	ConceptofRedoxsignaling–Roleofredoxsignalingin physiologicalandpathologicalprocesses	1
30.	MeasuringReactiveOxygenSpecies–Directandindirectassays measuringROSincludingchemiluminescenceandelectronspinresona nce	1
31.	Antioxidantdefenseandtheirmechanismofcytoprotectiveactions Enzymaticandnon-enzymaticantioxidantsinthebody	1
32.	Dietaryantioxidantsinlivestockandpoultryproductionincluding syntheticandherbalantioxidants	1
	Total	**36**

CourseTitle :AdvancesinReproductivePhysiologyCo
urseCode :VPY 712
CreditHours :2+1

Theory

Sr.No.	Topic	No. ofLectures
1.	Estrussynchronizationinfarmanimals(Cattle,Buffalo,SheepandGoat)	3
2.	SuperovulationandEmbryotransferinfarmanimals(Cattle,Buffalo,SheepandGoat)	3
3.	CollectionofSemeninfarmanimals	1
4.	Seminalplasmaproteinsandtheirimportanceindeterminingmalefertility	2
5.	Sexingofspermatozoa	2
6.	Cryopreservationofsemeninfarmanimals	2
7.	Collectionofoocytesfromliveanimalsandslaughterhousespecimens	1
8.	Gradingofoocytes	2
9.	*In-vitro*maturationofoocytes	2
10.	*In-vitro*fertilizationofoocytes	2
11.	*In-vitro*cultureofembryos	2
12.	Cryopreservationofembryosinfarmanimals	2
13.	Sexingofembryos	2
14.	Micromanipulationofgametesandembryos(Intracytoplasmicsperm injectionand somatic cellnuclear transfer)and theirapplications	3

15.	Transgenicanimalproductionanditsimportance	2
16.	Stemcellproductionanditsclinicalapplications	3
17.	Nanotechnologyanditsuseinfarmanimalbreedingand reproduction	2
	Total	**36**

Practical

Sr.No.	Topic	No. ofPracticals
1.	Semen analysis– Fructolytic index, zona freeovumtest,Acrosomalintegritytest	2
2.	Synchronizationandsuperovulationprotocols	2
3.	Ovumpickupfromsuperovulatedanimals	1
4.	Collectionofoocytesfromslaughterhousederivedovaries,grading andevaluation	2
5.	Capacitationofspermatozoa	1
6.	*In-vitro*fertilization,*In-vitro*embryoproduction	1
7.	Collectionofembryosusingnon-surgicalprocedures,Transferring embryosusingnon-surgicalprocedures.	2
8.	Oocyte/Embryo/ovarian/testiculartissuefreezingprotocols.	1
9.	DemonstrationonIntracytoplasmicsperminjection	1
10.	Micromanipulationofearlyembryos.	2
11.	Isolationandidentificationofembryonicstemcells	3
	Total	**18**

ListofJournals

- *ActaEndocrinologica*
- *AdvancesinClinicalChemistry*
- *Advances in Reproductive Physiology*
- *AdvancesinVeterinarySciences*
- *AmericanJournalofClinicalNutrition*
- *AmericanJournalofPhysiology*
- *AmericanJournalofVeterinary Research*
- *AnimalNutritionandFeedTechnology*
- *AnimalReproductionScience*
- *AnimalSciences*
- *AnnualReviewofPhysiology*
- *BuffaloJournal*
- *DomesticAnimalEndocrinology*
- *IndianJournalofAnimalReproduction*
- *IndianJournalofAnimalNutrition*
- *IndianJournalofAnimalPhysiology*
- *IndianJournalofAnimalResearch*
- *IndianJournalofAnimalScience*
- *IndianVeterinaryJournal*
- *JournalofEndocrinology*
- *JournalofPhysiology*
- *JournalofReproductionandFertility*
- *Neuroendocrinology*

e-Resources

- http://intl-joe,endocrinology-journals.org(JournalofEndocrinology)
- http://intl-ajpcon.physiology.org(AmericanJournalofPhysiology)

- http://arjournals.annualreviewes.org(AnnualReviewofPhysiology)
- www.jneurosci.org(JournalofNeuroscience)
- www3.interscience.wiley.com(JournalofPhysiologyandAnimalNutrition)
- http://jp.physioc.org.(JournalofPhysiology)

I. **CourseTitle :ResearchandPublicationEthics**

II. **CourseCode :RPE700**

III. **CreditHours :1+1**

IV. **Overview**

This course has total 6 units focusing on basics of philosophy of science and ethics,Research integrity, Publication ethics. Hands-on-sessions are designed to identifyresearch misconduct and predatory publications. Indexing and citation databases,open access publications, Research metrics (citations, h-index, Impact Factor, etc.)andplagiarismtoolswillbeintroducedinthiscourse.

V. **Pedagogy**

- Classroom teaching,Guestlectures, Group discussionsandpracticalsessions.

VI. **Evaluation**

- Continuous assessment will be done through tutorials, assignments, quizzes,and group discussions. Weightage will be given for active participation. Finalwritten examination willbeconducted at the endof the course.

VII. **CourseStructure**

- Thecoursecomprisesofsixmoduleslistedintablebelow.Eachmodulehas4-5units.

VIII. **Theory**

RPE01:PhilosophyandEthics

- Introductiontophilosophy:definition,natureandscope,concept,branches
- Ethics:definition,moralphilosophy,natureofmoraljudgementsandreactions

RPE02:ScientificConduct

- Ethicswithrespectto scienceandresearch
- Intellectualhonestyandresearchintegrity
- Scientificmisconducts:Falsification,Fabrication,andPlagiarism(FFP)
- Redundantpublications:duplicateandoverlappingpublications,salamislicing
- Selectivereportingandmisrepresentationofdata

RPE03:PublicationEthics

- Publicationethics:definition,introductionandimportance
- Bestpractices/standardssettinginitiativesandguidelines:COPE,WAME,etc.
- Conflictsofinterest
- Publicationmisconduct:definition,concept,problemsthatleadtounethi calbehaviorand vice versa,types
- Violationofpublicationethics,authorshipandcontributorship

- Identificationofpublicationmisconduct,complaintsandappeals
- Predatorypublishersandjournals

IX. **Practice**

RPE4:OpenAccessPublishing

- Openaccesspublicationsandinitiatives
- SHERPA/ RoMEO online resource to check publisher copyright and self-archivingpolicies
- SoftwaretooltoidentifypredatorypublicationsdevelopedbySPPU
- Journalfinder/journalsuggestiontools,viz.,JANE,ElsevierJournalFinder, Springer JournalSuggested,etc.

RPE05:PublicationMisconduct

A. **GroupDiscussions**
- Subjectspecificethicalissues,FFP,authorship
- Conflictsofinterest
- Complaintsandappeals:examplesandfraud fromIndiaand abroad

B. **Softwaretools**
- UseofplagiarismsoftwarelikeTumitin,Urkundandother opensourcesoftwaretools

RPE06:DatabasesAndResearchMetrics

A. **Databases**
- Indexingdatabases
- Citationdatabases:WebofScience,Scopus,etc.

B. **ResearchMetrics**
- ImpactFactorofjournalasperJournalCitationReport,SNIP,SIR,IPP,CiteScore
- Metrics:h-index,gindex,i10index,altmetrics

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

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

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