

ACADEMIC CALENDAR FOR SEMESTER I AND II (HONOURS & GENERAL) (2019-2020)

Honours Course

		SEMESTER-I			
Month	No. of Teaching days available	Topic		Class teaching in hours of each core	Tutorial In hours
		ZOOACOR01T Marks:50+25=75 NON-CHORDATE I	ZOOACOR02T Marks:50+25=75 ECOLOGY		
July,19	26	Unit 1: Protista, Parazoa & Metazoa i)Characteristic and classification up to classes ii) study of <i>Euglena</i> , <i>Amoeba</i> and <i>Paramoecium</i> iii)Locomotion and reproduction in protista Unit 2: Porifera i)characteristic and classification upto classes ii)Canal system and spicules in sponges Unit 3: Cnidaria i)characteristic and classification upto classes ii) coral and coral reefs	Unit -1 : Introduction to Ecology i)History of ecology, Autecology and synecology, Laws of limiting factors Unit -2: Population i)Unitary and Modular populations, Demographic factors, life tables, fecundity tables. Unit -3: Community i)Species diversity, abundance, dominance	22	4

		PRACTICAL 1.Study of whole mount of <i>Euglena</i> , <i>Amoeba</i> , <i>Paramoecium</i> . 2. Binary fission and Conjugation in <i>Paramoecium</i> 3. Examination of freshwater pond water collected from different places for diversity of protists in it.	PRACTICAL 1.Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided. 2.Determination of population density of a natural/hypothetical population.		
August,19	24	Unit 1: Protista, Parazoa & Metazoa iv) Evolution of symmetry and segmentation of Metazoa. v) Life cycle and pathogenicity of <i>Giardia</i> , <i>Leishmania</i> , Unit 3: Cnidaria iii) Polymorphism in Cnidaria Unit 6: Nematelminthes i)General characteristics and Classification upto classes ii) Origin and evolution of parasitic helminthes.	Unit -1 : Introduction to Ecology ii) levels of organization, study of physical factors, the Biosphere. Unit -2: Population ii)survivorship curves, dispersal and dispersion, iii) Geometric, exponential and logistic growth: equation and patterns, r and k strategies. Density dependent and density independent factor iv)Population interactions, Gause,s Principle with laboratory and field example, Lotka-Volterra equation for competition. Unit -3: Community ii)Richness, vertical stratification, Ecotone and edge effect.	22	4

		PRACTICAL 4.Study of <i>Sycon</i> , <i>Hyalonema</i> , <i>Euplectella</i> , <i>Spongilla</i> . 5. Study of <i>Obelia</i> , <i>Physalia</i> , <i>millepora</i> , <i>Aurelia</i> , <i>Tubipora</i> , <i>Corallium</i> . 6. Examination of freshwater pond water collected from different places for diversity of protists in it. 7. One specimen/slide of any Ctenophore	PRACTICAL 3. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided. 4. Sampling of Phytoplankton and zooplankton. 5.Study of species diversity. Shannon-Weiner index		
September,19	22	Unit-1: Protista, Parazoa & Metazoa vi) Life cycle and pathogenicity of <i>Entamoeba</i> and <i>Plasmodium</i> Unit 3: Cnidaria iv) Metagenesis in Obelia. Unit 6: Nemathelminthes iii) Life cycle and pathogenicity of <i>Ascaris</i>	Unit -3: Community iii)Ecological succession and one example of it. Unit -5: Applied Ecology i)Wildlife Conservation (in situ and ex-situ conservation) ii)Management strategies for tiger conservation. iii)Wildlife Protection act (1972)	18	4

		PRACTICAL viii) Study of <i>Alcyonium</i> , <i>Gorgonia</i> , <i>Metridium</i> , <i>Pennatula</i> , <i>Fungia</i> , <i>Meandrina</i> , <i>Madrepora</i> ix) study of adult <i>Fasciola hepatica</i> , <i>Taenia solium</i> and their life cycles. x) Study of adult <i>Ascaris lumbricoides</i> and its life stages	PRACTICAL 6. Measurement of temperature, turbidity/penetration of light. 7. Determination of pH 8. Study of species diversity. Shannon-Weiner index		
October, 19	3	Unit – 4: Ctenophora i) General characteristic	Unit -4: Ecosystem i) Types of ecosystem with an example in detail,	3	-
		PRACTICAL	PRACTICAL		
November, 19	24	Unit -5: Platyhelminthes i) General characteristics and Classification upto classes. ii) Life cycle and pathogenicity of <i>Fasciola</i> . Unit 6: Nemathelminthes iv) Life cycle and pathogenicity of <i>Ancylostoma</i> and <i>Wuchereria</i>	Unit 4: Ecosystem ii) Food chain, Detritus and grazing food chain. Linear and Y-shaped food chain. iii) Food web, energy flow through ecosystem, Ecological pyramids. Ecological efficiencies	20	4

		PRACTICAL xi) Field trip xii) Preparation of field report	PRACTICAL 8. Determination of Dissolve oxygen content 9. COD 10. Field Trip and preparation of report.		
December, 19	20	Unit – 4: Ctenophora ii) General characteristic Unit -5: Platyhelminthes Life cycle and pathogenicity of <i>Taenia solium</i>	Unit 4: Ecosystem iii) Nutrient and biogeochemical cycle with an example of Nitrogen cycle. Human modified ecosystem.	16	4
		PRACTICAL xiii) Preparation and submission of field report	PRACTICAL 11. Determination of free CO ₂ 12. Preparation submission of report.		

SEMESTER-II					
Month	No. of Teaching days available	Topic		Class teaching in hours of each core	Tutorial In hours
		ZOOACOR03T Marks:50+25=75 NON-CHORDATE-II	ZOOACOR04T Marks:50+25=75 CELL BIOLOGY		

January, '20	21	Unit 1: Introduction to Coelomates i) Evolution of Coelom Unit 3: Arthropoda i) General characteristics and Classification up to classes.	Unit 1: Overview of cells i) Prokaryotic and Eukaryotic cells Unit 2: Plasma membrane i) Various models of plasma membrane structure	17	5
		PRACTICAL i) Study of specimens	PRACTICAL i) Preparation of temporary stained squash of onion root tip to study various stages of mitosis.		
February, 20	20	Unit 1: Introduction to Coelomates ii) Evolution of metamerism Unit 2: Annelida i) General characteristics and Classification up to classes. ii) Excretion in Annelida. Unit 3: Arthropoda i) Vision in Arthropods ii) Respiration in Arthropods Unit 5: Mollusca i) General characteristics and Classification up to classes.	Unit 1: Overview of cells ii) Virus, Viroids, Mycoplasma, Prions. Unit 2: Plasma membrane ii) Transport across membranes: Active and Passive transport, Facilitated transport. iii) Cell junctions: Tight junctions, Desmosomes, Gap junctions iv) Extracellular Matrix-cell interaction. Unit 6: Nucleus i) Structure of nucleus: Nuclear envelope, Nuclear pore complex. Unit 7: Cell division i) Mitosis	16	4

		PRACTICAL Study of specimens	PRACTICAL ii) Preparation of temporary stained squash of onion root tip to study various stages of mitosis. iii) Study of various stages of meiosis. iv) Preparation of permanent slide to show the presence of Barr body in human female blood.		
March, 20	24	Unit 3: Arthropoda iii) Metamorphosis in insect iv) Social life in bees. Unit 4: Onychophora i) General characteristics and Evolutionary significance Unit 5: Mollusca ii) Respiration in Mollusca	Unit 3: Endomembrane System i) Structure and functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes. Unit 6: Nucleus ii) Nucleolus Chromatin: Euchromatin and heterochromatin. Unit 7: Cell division ii) Meiosis	20	4
		PRACTICAL Study of specimens	PRACTICAL v) DNA by Feulgen reaction vi) Preparation of permanent slide to show the presence of Barr body in human female blood.		
April, 20	24	Unit 3: Arthropoda v) Social life in termites Unit 5: Mollusca iii) Torsion and detorsion in Gastropoda Unit 6: Echinodermata i) General characteristics and Classification up to classes. Unit 7: Hemichordata i) General characteristics	Unit 4: Mitochondria and Peroxisome i) Mitochondria: Structure, semi-autonomous nature. ii) Endosymbiotic hypothesis iii) Peroxisome Unit 6: Nucleus iii) Packaging (Nucleosome) Unit 7: Cell division iii) Cell cycle and its regulation.	20	4

		PRACTICAL i)Study of specimens ii)Dissection of Digestive system of Periplaneta	PRACTICAL vii)Mucopolysaccharides by PAS reaction. viii)Cell viability by Trypan Blue staining.		
May,20	22	Unit 5: Mollusca iv)Pearl formation in bivalves. Unit 6: Echinodermata ii)Water-vascular system in Asteroidea Unit 7:Hemichordata ii)Phylogenetic relationship with non-chordates and chordates.	Unit 4: Mitochondria and Peroxisome iv)Mitochondrial Respiratory chain, Chemiosmotic hypothesis. Unit 7: Cell division iv)Cancer (Concept of oncogenes and tumour suppressor genes) Unit 8: Cell signaling i)Cell signaling pathways. ii)Types of signaling molecules and receptors. iii)GPCR and role of second messenger (cAMP)	18	4
		PRACTICAL i)Digestive system, septal nephridia and pharyngeal nepridia of earthworm. ii)Nervous system of Periplaneta. iii)Prepare Project report	PRACTICAL ix)Proteins by Mercurobromophenol blue/Fast Green. x) Cell viability by Trypan Blue staining.		
June,20	24	Unit 5: Mollusca v)Evolutionary significance of trochophore larva. Unit 6: Echinodermata iii)Larval forms in Echinodermata. iv)Affinities with chordates.	Unit 5: Cytoskeleton i)Structure and functions: Microtubules, Microfilaments and Intermediate filaments. Unit 7: Cell division v)Mechanisms of cell death	10	2

		PRACTICAL i)T.S. through pharynx, gizzard and typhlosolar intestine of earthworm. ii)Mount of mouth parts of Periplaneta. Preparation and submission of Project report.	PRACTICAL i)Proteins by Mercurobromophenol blue/Fast Green. ii)Mucopolysaccharides by PAS reaction. iii)Cell viability by Trypan Blue staining.		
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General Course

SEMESTER-I			
Month	No. of Teaching days available	Topic	Class teaching in hours of each core
		ZOOGCOR01T Marks:50+25=75 Animal Diversity	

July,19	26	<p>Unit-1 Kingdom Protista i)General characters and classification of Subkingdom Protozoa. ii)Locomotory organelles and locomotion in Protozoa Unit-4 Phylum Plathelminthes i)General characters and classification up to classes. ii)Life history of <i>Taenia solium</i>. Unit-8 Phylum Mollusca i)General characters and classification up to classes. ii)Respiration in <i>Pila</i></p> <p>PRACTICAL i)Spot identification of the specimens</p>	16
August,19	24	<p>Unit-2 Phylum Porifera i)General characters and classification up to classes. ii)Canal system in <i>Sycon</i>. Unit-3 Phylum Cnidaria i)General characters and classification up to classes. ii)Polymorphism in Hydrozoa Unit-7 Phylum Arthropoda i) General characters and classification up to classes. Unit-5 Phylum Nematoda i) General characters and classification up to classes. ii)Life history of <i>Ascaris lumbricoides</i> and its parasitic adaptation. Unit-6 Phylum Annelida i) General characters and classification up to classes.</p> <p>PRACTICAL Spot identification of the specimens</p>	16

September,19	22	Unit-7 Phylum Arthropoda i)Vision in insect. ii)Metamorphosis in insects. Unit-6 Phylum Annelida i)Nephridia in Annelida Unit-12 Pisces i)General characters and classification up to Subclasses. ii)Osmoregulation in Fishes .	12
		PRACTICAL Spot identification of the specimens	
October,19	3	Unit-13 Amphibia i)General characters and classification up to classes.	2
		PRACTICAL -	
November,19	24	Unit-9 Phylum Echinodermata i)General characters and classification up to classes. ii)Water-vascular system in Asterias Unit-10 Protochordates i)General features Unit-13 Amphibia	16

		i)Metamorphosis in Toad Unit-14 Reptiles i)General features and classification up to living Subclasses. ii)Biting mechanism in snakes, Poisonous and nonpoisonous snakes PRACTICAL i) ii)Study of the permanent slides ii)Identification of poisonous and non-poisonous snakes iii)Preparation of Animal album	
December,19	20	Unit-10 Protochordates i)Feeding in Branchiostoma Unit-11 Agnatha i) General characters and classification up to classes. Unit-15 Aves i)General characters and classification up to orders. ii)Flight adaptations in birds Unit-16 Mammals i)Classification up to Subclasses. ii)Origin and distribution of Cranial nerves in Cavia PRACTICAL i)Preparation and submission of Animal album	6

		SEMESTER-II
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Month	No. of Teaching days available	Topic	Class teaching in hours of each core
		ZOOGCOR02T Marks:50+25=75 Physiology and Biochemistry	
January,20	21	Unit-1: Nerve and muscle i)Structure of neuron Unit-2:Digestion i)Physiology of digestion in the alimentary canal. Unit-9: Protein: Structure and Metabolism i)Proteins and their biological functions, functions of amino acids, ii)Physiochemical properties of amino acids, Peptides – structure and properties. iii)Primary, secondary, tertiary and quaternary structure of proteins. iv)Transamination, Deamination. v)Urea cycle.	14
		PRACTICAL i)Preparation of Haemin crystals ii)Identification of permanent histological slides iii)Qualitative tests to identify functional groups of carbohydrates. iv)Lowry`s method for quantitative test of protein	

February,20	20	<p>Unit-1: Nerve and muscle ii)Resting membrane potential, Graded potential, Origin of action potential iii)Propagation of action potential through myelinated and unmyelinated nerve fibers. iv)Ultra-structure of skeletal muscle.</p> <p>Unit-2:Digestion ii)Absorption of carbohydrates, proteins and lipids.</p> <p>Unit-5:Cardiovascular system i)Composition of blood, Homeostasis. ii)Structure of heart. iii)Origin and conduction of the cardiac impulse. iv)Cardiac cycle.</p> <hr/> <p>PRACTICAL i)Preparation of Haemin crystals ii)Identification of permanent histological slides iii)Qualitative tests to identify functional groups of carbohydrates. iv)Lowry`s method for quantitative test of protein</p>	14
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March,20	24	<p>Unit-1: Nerve and muscle v)Molecular and chemical basis of muscle contraction.</p> <p>Unit-3: Respiration i)Pulmonary ventilation, Respiratory volumes and capacity.</p> <p>Unit-6: Reproduction and Endocrine gland i)Physiology of male reproduction: hormonal control of spermatogenesis. ii)Physiology of female reproduction: hormonal control of menstrual cycle.</p> <p>Unit-7: Carbohydrate: Structure and Metabolism i)Introduction to Carbohydrates, Structure and Types of Carbohydrates, Isomerism, ii) Glycolysis</p>	16
		<p>PRACTICAL i)Preparation of Haemin crystals ii)Identification of permanent histological slides iii)Qualitative tests to identify functional groups of carbohydrates. iv)Lowry`s method for quantitative test of protein</p>	

April,20	24	<p>Unit-3: Respiration ii)Transport of Oxygen. iii)Transport of Carbon-di-oxide. Unit-6: Reproduction and Endocrine gland iii)Structure and function of Pituitary. iv) Structure and function of Thyroid v) Structure and function of pancreas vi) Structure and function of adrenal Unit-7: Carbohydrate: Structure and Metabolism iii)Krebs cycle iv)Pentose phosphate pathway Unit-10: Enzymes i)Introduction, Classification of Enzymes ii)Mechanism of action iii)Enzyme kinetics iv)Inhibition and Regulation</p>	16
		<p>PRACTICAL i)Preparation of Haemin crystals ii)Identification of permanent histological slides iii)Qualitative tests to identify functional groups of carbohydrates. iv)Study of activity amylase under optimum conditions.</p>	

M ont	No of tea h	SEMESTER-III		Cl ass	Tutorial In hours
May,20	22	Unit-4: Excretion i)Structure of nephron. ii)Mechanism of urine formation iii)Counter-current Mechanism Unit-7: Carbohydrate: Structure and Metabolism v) Gluconeogenesis vi)Electron Transport System Unit-8: Lipid structure and Metabolism i)Introduction to lipids: Definitions; fats and oils; classes of lipids. ii)Biosynthesis of palmitic acid iii) B-oxidation of palmitic acid. PRACTICAL i)Preparation of Haemin crystals ii)Identification of permanent histological slides iii)Qualitative tests to identify functional groups of carbohydrates. iv)Study of activity amylase under optimum conditions.			12
June,20	24	-			0

ACADEMIC CALENDER FOR SEMESTER-III (2019-2020) (HONOURS)

		<u>Honours Course</u>				
		ZOOACOR05T Marks:50+25=75 CHORDATES	ZOOACOR06T Marks:50+25=75 PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS	ZOOACOR07T Marks:50+25=75 BIOCHEMISTRY		
July,2019	26	Unit 1: Introduction to Chordates: 1.General characteristics and outline classification of phylum Chordata. Unit 2: Protochordata 2. general characteristics and classification of Urochordata and Cephalochordata upto Classes. 3. Metamorphosis in Ascidia. 4.chordates features and feeding in Branchiostoma Unit 3: Origin of Chordates 1.Dipleurula concept and the Echinoderm theory of origin of chordates. 2. Advanced features of vertebrates over protochordates.	Unit 1: Tissues 1.Strusture,locations, classification and functions of epithelial tissues. 2.Strusture,locations,classification and functions of connective tissue tissues. 3.Strusture,locations, classification and functions of muscular tissue tissues. 4.Strusture,locations, classification and functions of nerve tissues.	Unit 1: Fundamentals of biochemical reaction and metabolism: 1.Ionization of water, weak acids and bases, buffering and pH changes in living system. 2. catabolism and anabolism, compartmentalization of metabolic pathways, Shuttle systems and membrane transporters; ATP as “Energy Currency of cell”; coupled reactions; Use of reducing equivalents and co-factors; intermediary metabolism and regulatory mechanisms.	22	4

		<p>PRACTICAL</p> <p>1. Protochordata <i>Herdmania</i>, <i>Branchiostoma</i> Colonial Urochordates; Sections of <i>Balanoglossus</i> through proboscis and branchiogenital regions, Sections of <i>Amphioxus</i> through pharyngeal, intestinal and caudal regions, <i>Herdmania</i> spicules, 2. Agnatha <i>Petromyzon</i>, <i>Myxine</i></p>	<p>PRACTICAL</p> <p>1. Recording of simple muscle twitch with electrical stimulation (Virtual)</p>	<p>PRACTICAL</p> <p>1. Qualitative tests of functional groups in carbohydrate, proteins and lipids.</p>		
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August, 2019	24	<p>Unit 4: Agnatha 1. General characteristics and classification of cyclostomes up to order.</p> <p>Unit 5: Pisces 1. General characteristics and classification of Chondrichthyes and Osteichthyes upto Subclasses. 2. Accessory respiratory organ 3. Migration of fishes 4. Parental care of fishes. 5. Swim bladder in fishes.</p> <p>Unit 6: Amphibia 1. General characteristics and classification up to living orders 2. Metamorphosis in amphibia.</p>	<p>Unit 2: Bone and Cartilage 1. Structure and types of bones and cartilages, Ossification.</p> <p>Unit 5: Reproductive System 1. Histology of testis 2. Histology of ovary. 3. physiology of reproduction.</p>	<p>Unit 2: Carbohydrates 1. Structure and biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of monosaccharides, 2. Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis.</p> <p>Unit 3: Lipids: 1. Structure and significance: Physiologically important saturated and unsaturated fatty acids, Triacylglycerols, Phospholipids, Sphingolipids, Steroids, Eicosanoids and terpenoids. 2. Lipid metabolism: beta-oxidation of fatty acids; fatty acid biosynthesis.</p>	22	4
		<p>PRACTICAL 3. Fishes Scoliodon, Sphyrna, pristis, Torpedo, chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetradon, Anabas, Flat fish.</p>	<p>PRACTICAL 2. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibers and nerve cells.</p>	<p>PRACTICAL: 1. Paper chromatography of amino acids 2. Quantitative estimation by Lowry method.</p>		

September, 2019	22	<p>Unit 6: Amphibia 3. Parental care in amphibian.</p> <p>Unit 7: Reptilia 1. General characteristics and classification up to living orders. 2. poison apparatus and biting mechanism in Snake.</p> <p>Unit 8: Aves 1. General characteristics and classification up to Sub-classes 2. Exoskeleton in Birds 3. migration in Birds.</p>	<p>Unit 3: Nervous System 1. Structure of neuron 2. Resting membrane potential 3. Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers. 4. Types of synapse. 5. Reflex action and its type 6. Synaptic transmission and Neuromuscular junction.</p>	<p>Unit 4: Proteins: 1. Amino acid structure, Classification, General and Electrochemical properties of α amino acids. 2. Physiological importance of essential and non-essential amino acids 3. proteins bonds stabilizing protein structure; Levels of organization 4. Protein metabolism: Transamination, Deamination, Urea cycle, Fate of C-skeleton of Glucogenic and Ketogenic amino acids.</p>	18	12
		<p>PRACTICAL 4. Amphibia: Ichthyophis, Necturus, Bufo, Hyla, Alytes, Salamander, 5. Reptilia: Chelone, Trionix, Hemidactylus, Varanus, Uromastix, Chameleon, Ophiosaurus.</p>	<p>PRACTICAL 3. Study of permanent slides of Mammalian skin, cartilage, bone, Spinal cord, Nerve cell, pituitary</p>	<p>PRACTICAL 4. Demonstration of protein separation by SDS-PAGE</p>		
October, 2019	3	<p>Unit-8 4. Principles and aerodynamics of flight.</p>	<p>Unit 4: Muscular System 1. Histology of different types of muscle.</p>	<p>Unit 5: 1. Structure: purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids</p>	3	-

		PRACTICAL Mount of weberian Ossicles of Mystus or Grass Carp.	PRACTICAL 3. Study of permanent slides of Pancreas, testis,			
November, 2019	24	Unit 9: Mammals 1. General characteristics and classification up to living orders. 2. Phylogenetic significance of Prototheria 3. Exoskeleton derivatives of mammals. 4. Adaptive radiation in mammals with reference to locomotory appendages.	Unit 4: Muscular System 2. Ultrastructure of skeletal muscle 3. Characteristic of muscle fibers. 4. Molecular and chemical basis of muscle contraction. Unit 5: Reproductive system 1. histology of testis and ovary 2. Physiology of reproduction	Unit 5: 2. Types of DNA and RNA, Complementarity of DNA, Hypo-Hyperchromaticity of DNA. 3. Outlines of nucleotide metabolism. Unit 6: Enzymes: 1. Nomenclature and classification; Cofactors; Specificity of enzyme action; isozymes; 2. Mechanism of enzyme action; Enzyme kinetics; Derivation of Michaelis- Menten equation, Lineweaver-Burk plot; Factors affecting rate of enzyme-catalyzed reaction	20	4

		PRACTICAL 5.Reptilia Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus. Identification of poisonous and non-poisonous snakes. 6. Aves Study of six common birds from different orders (Stork, Owl/Falcon, Sun bird, Jacanna, Duck) – types of beaks and claws.	PRACTICAL 3. Study of permanent slides of ovary, adrenal and thyroid 4. Microtomy: Preparation of permanent slide of any five (lung, salivary gland, stomach, small intestine, large intestine only) mammalian rat tissues	PRACTICAL 5. Study of the enzymatic activity of Trypsin and Lipase.		
Decembr,2019	20	Unit 9: Mammals 5. Echolocation in Microchiropterans and Cetaceans. Unit 10: Zoogeography 1.Zoogeographical real. 2. Plate tectonic and continental drift theory. 3. Distribution of birds and mammals in different realms.	. Unit 6: Endocrine System 4. Mechanism of hormone action. 5.Signal transduction pathways for Steroidal and Non-steroidal hormones. 6. Hypothalamus – principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system.	Unit 6: 3. Enzyme inhibition; Allosteric enzymes and their kinetics; Strategy of enzyme action-catalytic and Regulatory Unit 7: 1.Redox system; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System.	16	4

		PRACTICAL 7. Mammalia Sorex, Bat, Funambulus, Loris, Herpestes, Erinaceous Power point presentation on study of any two animals from animals from two different classes by students 8. Pecten from Fowl head. Dissection of Fowl head.	4. Microtomy: Preparation of permanent slide of any five (lung, salivary gland, stomach, small intestine, large intestine only) mammalian rat tissues	PRACTICAL 6. Performing the Acid and alkaline phosphatase assay from serum/tissue.		
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ACADEMIC CALENDER FOR SEMESTER-IV (2019-2020) (HONOURS)

Month	No of teaching days available	SEMESTER-IV			Class teaching in hours of each core	Tutorial In hours
		Honours Course				
		ZOOACOR08T Marks:50+25=75 COMPARATIVE ANATOMY	ZOOACOR09T Marks:50+25=75 PHYSIOLOGY: LIFE SUSTAINING SYSTEM	ZOOACOR10T Marks:50+25=75 IMMUNOLOGY		

January'2020	21	<p>Unit 1: Integumentary System Structure, function and derivatives of integument in amphibian, birds and mammals</p>	<p>Unit 1: Physiology of Digestion 1.Structural organization and functions of Gastrointestinal tract and Associated gland; 2.Mechanical and chemical digestion of food, 3. Absorption of carbohydrates, Lipids, Proteins and Nucleic acids 4. Digestive enzymes</p>	<p>Unit 1: Overview of Immune System 1.Basic concepts of health and diseases. 2. Historical perspective of immunology. 3. Organs (primary and secondary lymphoid organs and its importance) and cells of the immune system. 4. Concept of Haematopoiesis and development of progenitor cells of the immune system Unit 2: Innate and Adaptive Immunity 1.Principle of Innate and Adaptive Immunity 2. Components of innate immunity</p>	17	5
		<p>PRACTICAL 1.Study of placoid, cycloid and ctenoid scales through permanent slides/photographs.</p>	<p>PRACTICAL 1.Determination of ABO blood group.</p>	<p>PRACTICAL 1.Demonstration of lymphoid organs</p>		

February, 2020	20	<p>Unit 2: Skeletal system Overview of axial and appendicular skeleton; Jaw suspension; Visceral arches</p>	<p>Unit 2: Physiology of Respiration 1. Mechanism of Respiration 2. Respiratory volumes and capacities 3. Transport of Oxygen and Carbon dioxide in blood. 4. Dissociation curve and the factors influencing it. 5. respiratory pigments 6. Carbon monoxide poisoning.</p>	<p>Unit 2: Innate and Adaptive Immunity 3. Component of adaptive immunity Unit 3: Antigen, Antigen presentation and MHC 1. Concept of Antigen, Immunogen, Allergen and Pathogen 2. Adjuvants and haptens, 3. Factors influencing immunogenicity, Epitope 4. Types of Antigen Presenting Cells (APCs) 5. Structure of Major Histocompatibility Complex (MHC) molecules.</p>	16	4
		<p>PRACTICAL 2. Study of disarticulated skeleton of toad, pigeon and guinea pig</p>	<p>PRACTICAL 2. Enumeration of red blood cells and white blood cells using haemocytometer</p>	<p>PRACTICAL 2. Histological study of spleen, thymus and lymph nodes through slides/photographs</p>		

March, 2020	24	<p>Unit 3: Digestive System Comparative anatomy of stomach; dentition in mammals</p> <p>Unit 4: Respiratory System Respiratory organs in fish, amphibian</p>	<p>Unit 3: Physiology of Circulation:</p> <ol style="list-style-type: none"> 1. Components of blood and their function 2. Structure and functions of hemoglobin 3. Haemostasis 4. Blood clotting system. 5. Fibrinolytic system 6. Haemopoiesis 7. Basic steps and its regulation. 8. Blood groups; ABO and Rh factor. 	<p>Unit 3: Antigen, Antigen presentation and MHC</p> <ol style="list-style-type: none"> 6. Mechanism of antigen presentation and involvement of MHC molecules in details 7. Co-stimulatory molecules on APC <p>Unit 3: T Cell development</p> <ol style="list-style-type: none"> 1. Structure of T cell receptors, Co-stimulatory molecules on T cells 2. Concept of synapse between APC and T cells in details 3. Central differentiation of T cells; 4. T cell selection in thymus. 5. Peripheral differentiation of T cells; Th1 and Th2 	20	4
		<p>PRACTICAL</p> <p>3. Demonstration of carapace and plastron of turtle.</p>	<p>PRACTICAL</p> <p>3. Estimation of haemoglobin using Sahli's Haemoglobinometer</p>	<p>PRACTICAL</p> <p>3. Preparation of stained blood film to study various types of blood cells</p>		

April, 2020	24	<p>Unit 4: Respiratory system Respiratory organs of birds and mammals</p> <p>Unit 5: Circulatory System General plan of Circulation, Comparative account of heart and aortic arches</p>	<p>Unit 4: Physiology of Heart</p> <ol style="list-style-type: none"> 1. Structure of mammalian heart. 2. Coronary circulation, 3. Structure and working of conducting myocardial fibers 4. Origin and conduction of cardiac impulses 5. Cardiac cycle and cardiac output. 6. Blood pressure and its regulation. 	<p>Unit 4: Immunoglobulin</p> <ol style="list-style-type: none"> 1. Structure and functions of different classes of immunoglobulins 2. Antigen-antibody interaction 3. Immunoassay (ELISA and RIA) 4. Hybridoma technology <p>Monoclonal antibody production</p> <p>Unit 7: Complement system</p> <ol style="list-style-type: none"> 1. Components and pathways of complement activation 	20	4
		<p>PRACTICAL</p> <ol style="list-style-type: none"> 4. Identification of mammalian skulls: one herbivorous (Guinea pig) and one carnivorous (dog) 	<p>PRACTICAL</p> <ol style="list-style-type: none"> 4. Preparation of haemin and haemochromogen crystals 	<p>PRACTICAL</p> <ol style="list-style-type: none"> 4. ABO blood group determination 		
May, 2020	22	<p>Unit 6: Urinogenital System: Succession of kidneys, Evolution of urinogenital ducts, Types of mammalian uteri</p> <p>Unit 7: Nervous System Comparative account of brain</p>	<p>Unit 5: Thermoregulation and Osmoregulation</p> <ol style="list-style-type: none"> 1. Physiological classification based on thermal biology 2. Thermal biology of endotherms 3. Osmoregulation in aquatic vertebrates; 4. Extra-renal osmo-regulatory organs in vertebrates 	<p>Unit 6: Cytokines and Chemokines</p> <ol style="list-style-type: none"> 1. Brief concept on types of Cytokines and chemokines 2. Cytokines (source and function of IL-1, 2, 4, 5, 6, 8, 10, 12, interferons, TNF, TGF, GM-CSF, M-CSF) 3. Chemokines (source and function of CCL2, CCL3, CCL4, CCL5, CxCL8, CxCL10) 	18	4

		PRACTICAL 5. Dissection of Tilapia: circulatory system, brain	PRACTICAL 5. Recording of blood pressure using a sphygmomanometer/digital meter	PRACTICAL 5. Demonstration of ELISA using kit		
June, 2020	24	Unit 7: Nervous System: Cranial nerves in mammals Unit 8: Sense organs Classification of receptors, Brief account of auditory receptors in vertebrate.	Unit 6: Renal Physiology 1. Structure of kidney and its functional unit 2. Mechanism of urine formation, 3. Regulation of acid-base balance.	Unit 8: Hypersensitivity 1. Gell and Coombs classification and brief description of various types of hypersensitivity. Unit 9: Immunology of diseases 1. Malaria, Visceral Leishmaniasis, Filariasis, Dengue and Tuberculosis Unit 10: Vaccines 1. Various types of vaccines. 2. Active and passive immunization (artificial and natural)	10	2
		5. Dissection of Tilapia: Urinogenital system, pituitary	5. Practice and repeat of previous practicals	5. Practice and repeat of previous practicals		

ACADEMIC CALENDAR FOR SEMESTER III, IV (2019-2020) (GENERAL)

Month	No. of Teaching days	SEMESTER-III	Class teaching in hours of each core
		Topic	

		ZOOGCOR03T Marks:50+25=75 Insect, Vectors & Diseases	ZOOSSEC01M Aquarium Fish Keeping	
July,19	26	Unit-1 Introduction to Insects i)General features of insects Morphological features, Head-Eyes, Types of antennae, Mouth parts with respect to feeding habit Unit-7 Hemiptera as Disease Vectors Bugs as insect vectors; Blood-sucking bugs, Chaghas disease.	Unit-1 Introduction to Aquarium Fish Keeping The potential scope of aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes	16
		PRACTICAL 1.Mounting and study of different kinds of mouth parts of insects		
August,19	24	Unit-3 Insects as vector Detailed features of insect orders as vectors – Diptera, Siphonoptera, Siphunculata, Hemiptera. Unit-7 Hemiptera as Disease Vectors Bed bugs as mechanical vectors, Control and prevention measures.	Unit-2 Diversity of Aquarium fishes and their biology Common characters and sexual dimorphism of Fresh water and Marine aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, angel fish, Blue morph, Anemone fish and Butterfly fish	16
		PRACTICAL 2. Spot identification of following insect vectors through permanent slides/photographs: <i>Aedes</i> , <i>Culex</i> , <i>Anopheles</i> , <i>Pediculus humanuscapitis</i> , <i>Pediculus humanuscorporis</i> ,		

September, 19	22	Unit-2 Concept of Vectors Brief introduction to vectors (mechanical and biological) Reservoirs, Host-vector relationship, Adaptations as vectors, Host specificity. .	Unit-2 Diversity of Aquarium fishes and their biology Indigenous fishes suitable aquaria, problems of natural population depletion. Problem with exotic fishes	12
		PRACTICAL 2. Spot identification of following insect vectors through permanent slides/photographs: <i>Phithiruspubis</i> , <i>Xenopsylla cheopis</i> , <i>Cimex lectularius</i> , <i>Phlebotomus argentipes</i> , <i>Musca domestica</i> .		
October, 19	3	Unit-4 Dipteran as Disease Vectors Study of important Dipteran vectors – Mosquitoes.	-	2
November, 19	24	Unit- 4 Dipteran as Disease Vectors Study of important Dipteran vectors – Sand fly, Housefly Study of mosquito born diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis, Control of mosquitoes. Unit – 6 Siphunculata as disease vectors Human louse (head, body and pubic louse) as important insect vectors; Control of human louse	Unit-3 Food and feeding of aquarium fishes Use of live fish feed organism Preparation and composition of formulated fish feeds, Aquarium fish as larval predator. Unit-4 Fish transportation Live fish keeping, breeding, transport – Fish handling, packing and forwarding techniques	16
		PRACTICAL 3. Study of different diseases transmitted by above insect vectors		

December,19	20	Unit-Siphonaptera as disease vectors Fleas as important insect vectors; Host-specificity, Study of flea borne diseases – plague, Typhus fever, Contrl of fleas	Unit-5 Maintenance of Aquarium General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry	6
		PRACTICAL 4. Submission of a project report on any of the insect vectors and disease transmitted		
		SEMESTER-IV		
		Topic		
Month	No. of Teaching days	ZOOGCOR03T Marks:50+25=75 Environment and Public Health	ZOOSSEC02M Vermicompost Production	
January 2020	21	Unit-1 Introduction Sources of environmental hazards, Hazard identification and accounting, Fate of toxic and persistence substances in the environment, Dose response evaluation, Exposure assessment	Unit-1 Introduction to Vermicompost Production Natural role of earthworms in soil fertility, Concept of Vermicompost – the need for it Unit-5 Properties of the Vermicompost Unit-6 benefits of vermicompost	14
		PRACTICAL To determine pH, Cl, SO4, NO3 in soil and water sample from different location.		
February 2020	20	Unit-2 Climate Change Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health.	Unit-2 Production Suitable worm species and their availability-for large scale/small scale, Climate and temperature, Feedstock- for small scale and home farming/ large scale or commercial	14
		PRACTICAL To determine pH, Cl, SO4, NO3 in soil and water sample from different location.		

March 2020	24	Unit-4 Waste management technologies Sources of waste, types and characteristics, sewage disposal and its management, solid waste disposal	Unit-3 Operations and maintenance Smells, Moisture, Pest species, Worms escaping, Nutrient levels Unit-4 Harvesting	16
		PRACTICAL To determine pH, Cl, SO ₄ , NO ₃ in soil and water sample from different location.		
April 2020	24	Unit-4 Waste management technologies Biomedical waste handling and disposal, Nuclear waste handling and disposal, waste from thermal plants. Unit-5 Diseases Cause, symptoms and control of tuberculosis, Asthma, Cholera,	Unit-7 Use as soil conditioner Unit-8 Application of	16
		PRACTICAL To determine pH, Cl, SO ₄ , NO ₃ in soil and water sample from different location.		
May 2020	22	Unit-5 Diseases Cause, symptoms and control of Minamata disease, typhoid Unit-3 Pollution Air, water, noise pollution sources and effects, Pollution control.	Unit-9 Visit to Vermicompost centre and Submission of Report.	12
		PRACTICAL To determine pH, Cl, SO ₄ , NO ₃ in soil and water sample from different location.		

June 2020	24		.	0
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ACADEMIC CALENDER FOR III YEAR HONOURS 2019-2020

Month	No. of Teaching days available	PART-III (HONOURS)	Class teaching in hours of each core	Tutorial In hours
		TOPIC		
July, 19	26	PAPER-VII MODULE 701: ANIMAL PHYSIOLOGY 1.transport across cell surface membrane, Donan membrane equilibrium 2. Function of mammalian blood: Oxygen transport and CO2 transport. 3. Neurophysiology MODULE 703: HISTOLOGY 1.Basic tissue types PAPER VIII MODULE 801: DEVELOPMENTAL BIOLOGY 1.outlines of historical concepts and experiments in the emergence of developmental biology. MODULE 802: ENVIRONMENTAL POLLUTION AND TOXICOLOGY 1.Environmental pollution: water, soil, air and sound pollution	22	4

		PRACTICAL GROUP-A 1. Blood slide preparations to identify and study the characteristic features of different types of WBC, total count of WBC. GROUP-B 1. identification of chick, s embryonic stages (at 24, 48 and 96 hrs). 2. Identification of fry stages of a carp fish		
August, 19	24	PAPER-VII MODULE 701: ANIMAL PHYSIOLOGY 4. Respiration 5. General architecture of skeletal muscle and smooth muscle. MODULE 703: HISTOLOGY 2. Membrane specializations of epithelia. 3. Exocrine glands PAPER VIII MODULE 801: DEVELOPMENTAL BIOLOGY 2. Germ layers and its contributions to the development of different tissues in vertebrates. 3. origin of germ layers, structural features of sperms and eggs in sea urchins and in mammals, gametogenesis in mammals. MODULE 802: ENVIRONMENTAL POLLUTION AND TOXICOLOGY 2. Environmental laws: major ones applicable in West Bengal.		
		PRACTICAL GROUP-A 2. Determination of haemoglobin content of goat/rat blood by Sahli's hemoglobinometer 3. Human BP and pulse measurement GROUP-B 3. Morphometric study	22	4

September,19	22	<p>PAPER-VII MODULE 701: ANIMAL PHYSIOLOGY 6.Swim bladder and its functions in teleosts. 7. water and osmotic regulations. MODULE 703: HISTOLOGY 4. Principle of tissue fixation, staining 5. Histological structure of mammalian nephron and functions of each regions. PAPER VIII MODULE 801: DEVELOPMENTAL BIOLOGY 4. Fertilization 5. cleavage MODULE 802: ENVIRONMENTAL POLLUTION AND TOXICOLOGY 3. Toxicology: including its significance as a branch of science. 4. Dose-response relationship.</p> <p>PRACTICAL GROUP-A 4. Determination of soil and water ph. 5. Quantification of free CO2 GROUP-B Morphometric study</p>	18	4
October,19	3	<p>PAPER-VII MODULE 701: ANIMAL PHYSIOLOGY 8. bioluminescence MODULE 802: ENVIRONMENTAL POLLUTION AND TOXICOLOGY 5. In vivo and in vitro toxicity test</p>	3	

November,19	24	PAPER-VII MODULE 701: ANIMAL PHYSIOLOGY 9. Urine formation in human kidney MODULE 702: ENDOCRINOLOGY AND REPRODUCTIVE BIOLOGY 1. Classification of vertebrate hormones based on chemical nature and mechanism of action. 2. Hormone delivery system 3. Feedback control of hormone secretion MODULE 703: HISTOLOGY 6. Histology of stomach, pancreas, testis, ovary, thyroid, lymph node PAPER VIII MODULE 801: DEVELOPMENTAL BIOLOGY 6. Gastrulation MODULE 802: ENVIRONMENTAL POLLUTION AND TOXICOLOGY 6. Introduction to the concepts of detoxification mechanism.	20	4
		PRACTICAL GROUP-A 6. Quantification of dissolved O ₂ (Winkler's method) GROUP-B Medical entomology		

December, 19	20	PAPER-VII MODULE 702: ENDOCRINOLOGY AND REPRODUCTIVE BIOLOGY 4. Hormone biosynthesis 5. Physiologic function s of hormones: insulin, glucagon, T3 and T4 PAPER VIII MODULE 801: DEVELOPMENTAL BIOLOGY 7. Organogenesis: development brain in chick. MODULE 805: MEDICAL ZOOLOGY 1.Mosquito-borne diseases: malaria and filarial- causative agents, their life cycle, modes of infections in man, major modes of treatments, major vector species in India, their ecology and life cycles, control measures. MODULE 006: ECONOMIC ZOOLOGY 1.Fish and Fishery	16	4
		PRACTICAL GROUP-A 7. Microtomy GROUP-B Medical entomology		

January, 2020	21	PAPER-VII MODULE 702: ENDOCRINOLOGY AND REPRODUCTIVE BIOLOGY 6. Hormonal control of spermatogenesis 7. Hormonal control of mammalian ovarian cycle, difference between menstrual and estrous cycle. PAPER VIII MODULE 801: DEVELOPMENTAL BIOLOGY 8. Conceptual outlines of cell potency and stem cells. HOX genes in development. MODULE 805: MEDICAL ZOOLOGY 2. Mosquito-borne diseases: Dengue and DHF, Chikungunya – causative virus, symptoms and treatments. MODULE 006: ECONOMIC ZOOLOGY 2. Sericulture 3. Apiculture	17	5
		PRACTICAL GROUP-A 7. Microtomy GROUP-B Repeats and practice		

February, 2020	20	PAPER-VII MODULE 702: ENDOCRINOLOGY AND REPRODUCTIVE BIOLOGY 8. Mechanism of hormone actions PAPER VIII MODULE 801: DEVELOPMENTAL BIOLOGY 9. Sex determination in Drosophila and Man 10. Environmental sex determination in reptiles. MODULE 805: MEDICAL ZOOLOGY 3. Visceral Leishmaniasis-causative species and vectors in West Bengal MODULE 006: ECONOMIC ZOOLOGY 4. Lac culture 5. Cattle, goats and lambs: different breeds, their advantages and disadvantages, importance of indigenous breeds.	16	4
		PRACTICAL GROUP-A 7. Microtomy GROUP-B Repeats and practice		
March, 2020	24	PAPER-VII MODULE 702: ENDOCRINOLOGY AND REPRODUCTIVE BIOLOGY 9. Endocrine disorders(symptoms and causes only): diabetes insipidus; IDDM and NIDDM, Hypothyroidism and hyperthyroidism, Conn,s and Cushing,s syndrome. MODULE 805: MEDICAL ZOOLOGY 4. Common ticks and mites in human surroundings and diseases caused by them. MODULE 006: ECONOMIC ZOOLOGY 6. Poultry birds: different breeds, their advantages and disadvantages, importance of indigenous breeds.	20	4
		PRACTICAL -		

April, 2020	24	--	20	
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ACADEMIC CALENDER FOR III YEAR (GENERAL) 2019-2020

Month	No. of Teaching days	PART - III (GENERAL)	Class teaching in hours of each core
		Topic	
July, 19	26	PAPER-IV A: AQUACULTURE 1.Principles, definition and scope. Fisheries sources of India. Exotic fishes – their merits and demerits. Induced breeding and its importance.	16
		WILD-LIFE AND BIODIVERSITY Conservation of wild life – important and strategies, Concept of biosphere reserve, National Park and Wild life sanctuary	
		PRACTICAL 1.Identification of specimen 2. Estimation of dissolved O ₂ content water	

August, 19	24	PAPER-IV A: AQUACULTURE Basic principle of different aquaculture system (Polyculture and integrated farming). Marine pearl culture WILD-LIFE AND BIODIVERSITY Basic concept of biodiversity, Biodiversity hotspot	16
		PRACTICAL 1. Identification of specimen 2. Estimation of dissolved CO ₂ content water	
September, 19	22	PAPER-IV A: AQUACULTURE Culture of prawn and shrimp WILD-LIFE AND BIODIVERSITY Endangered Indian mammals, Animal Cruelty Prevention Act	12
		PRACTICAL 1. Identification of specimen 2. Pedigree analysis	
October, 19	3	PAPER-IV A SERICULTURE Characteristics of sericulture industry and its scope	2
November, 19	24	PAPER-IV A SERICULTURE Kinds of silk worm, host plants. Life history and rearing of Bombyx mori, harvesting and processing of cocoon, reeling and extraction of silk. BIOTECHNOLOGY AND IMMUNOLOGY Basic concept of genetic engineering and cloning	16

		PRACTICAL 1. Identification of specimen 2. Determination of ABO blood group and Rh factor	
December, 19	20	PAPER-IV A SERICULTURE Pest on mulberry plants and diseases of Bombyx mori and control measures. BIOTECHNOLOGY AND IMMUNOLOGY Concept of immunity	6
		PRACTICAL 1. Identification of specimen	
January 2020	21	PAPER-IV A APICULTURE Types of honey bees, modern methods of apiary management, products and its use. Problems and prospects. BIOTECHNOLOGY AND IMMUNOLOGY Outline structure and classification of immunoglobulin; antigen-antibody reaction	14
		PRACTICAL 1. Identification of specimen 2. Measurement of pH of water 3. Field trip	

February 2020	20	PAPER-IV A PEST AND PEST MANAGEMENT Pest – definition, types, life history and control i) Scirpophaga ii) Sitophilus and iii) Bandicoota, Concept on IPM BIOTECHNOLOGY AND IMMUNOLOGY Basic principle of vaccination.	14
		PRACTICAL 1. Identification of specimen 2. Sampling of zooplankton and extraction of soil micro-arthropods	
March 2020	24	PAPER-IV A POULTRY AND POULTRY MANAGEMENT Duck and fowl – Types of breeds, rearing and disease management.	16
		PRACTICAL 1. Test for food colors/adultation	
April, 2020	24	--	16