ACADEMIC QUARTER	CLASS	NAME OF THE TEACHER	TOPIC TO BE COVERED	NO OF LECTURES
JULY 22, TO SEPTEMBER 22	1ST SEMESTER (HONS.) HONS. (THEORY+ PRACTICAL) GENERAL (THEORY+ PRACTICAL) SYLLABUS TOPICS ARE TO BE ALLOTED	Dr Soumik Agarwal	**ZOOL DC1:Non-Chordates I (Protists to Pseudo-coelomates)** Unit 1: Basics of Animal Classification: Six kingdom concept of classification (Carl Woese) Unit 2: Protista: General characteristics and classification up to phylum; Locomotion in Euglena, Paramoecium and Amoeba; Conjugation in Paramoecium; Life cycle and pathogenicity of Plasmodium vivax and Entamoeba histolytica. Unit 3: Porifera: General characteristics and classification up to classes; Canal system, cell types and spicules in sponges. **Unit 7: Nemathelminthes:** General characteristics and classification up to classes; Life cycle, pathogenicity, parasitic adaptations and control measures of *Ascaris lumbricoides* and *Wuchereria bancrofti* Practical:- Identification; **Staining/mounting**: Any protozoa/helminth from gut of cockroach.	18
	1ST SEMESTER (Gen)		**Discipline Core Courses (DC): Zoology for General Studies** **(A1)DC 1: Animal Diversity and Ecology** **Theory[(A1)-ZOOL-G-DC 1-T]:** **Group A: Biology of Non-Chordates(=10 marks)** **Unit 1: Basics of Animal Classification -** Six kingdom concept of classification (**Carl Woese).** **Unit 2: Protista and Metazoa -** Protozoa-general characteristics and classification up to phylum, locomotion in *Euglena*, *Paramoecium* and *Amoeba*, conjugation in *Paramoecium*. **Unit 3: Porifera -** General characteristics and classification up to classes, canal system in sponges. **Unit 4: Cnidaria -** General characteristics and classification up to classes, metagenesis in *Obelia*; corals and coral reef diversity, functions & conservation. **Unit 5: Ctenophora -** General characteristics and classification up to class. **Unit 6: Platyhelminthes -** General characteristics and classification up to classes; life cycle and pathogenicity and control measures of *Fasciola hepatica,* parasitic adaptation of *Fasciola* sp.	18
	3RD SEMESTER (HONS.)		**ZOOL DC5: Cell Biology and Principles of Genetics** **Group B: Principles of Genetics** **Unit 1: Mendelian Genetics and its Extension-(i)** Principles of inheritance, incomplete dominance and co-dominance, multiple alleles (with special reference to blood group), lethal alleles, pleiotropy, gene interactions, (ii) Sex-linked, sex-influenced and sex-limited inheritance, polygenic inheritance (brief idea). **Unit 2: Linkage, Crossing Over and Chromosomal Mapping-**Linkage, somatic crossing over, cytological basis of crossing over, molecular mechanism of crossing over. **Group B: Principles of Genetics** **Unit 1: Mendelian Genetics and its Extension-(i)** Principles of inheritance, incomplete dominance and co-dominance, multiple alleles (with special reference	45

			to blood group), lethal alleles, pleiotropy, gene interactions, (ii) Sex-linked, sex-influenced and sex-limited inheritance, polygenic inheritance (brief idea). **Unit 2: Linkage, Crossing Over and Chromosomal Mapping-**Linkage, somatic crossing over, cytological basis of crossing over, molecular mechanism of crossing over.	
	3RD SEMESTER (Gen)		**(A3)DC7 Physiology and Biochemistry** **Group A: Physiology (= 12.5 marks)** **Unit 1: Digestion and Absorption of Food-** Digestion and absorption of carbohydrates, fats and proteins. **Unit 2: Functioning of Excitable Tissue (Nerve and Muscle):** Structure of neuron, Propagation of nerve impulse (myelinated and non-myelinated nerve fibre); structure of skeletal muscle, Mechanism of muscle contraction, Neuromuscular junction, Synaptic transmission. Practical Group A: Experimentation Physiology i. Preparation of temporary mounts: Blood film. ii. Preparation of hemin and hemochromogen crystals iii. Estimation of haemoglobin using Sahli's haemoglobinometer.	18
	5th SEMESTER (Hons)		**ZOOL DC11: Histology and Endocrinology** Unit1: Muscular system-Histology of different types of muscle, Ultra structure of skeletal muscle. Unit:2: Histo-architechture of liver and its function. Unit 3: Introduction to Endocrinology- General idea of endocrine systems, classification, characteristic and transport of hormones, neurosecretions and neurohormones. Unit 4: Epiphysis, Hypothalamo-hypophysial Axis-(i) Structure of pineal gland, secretions and their functions in biological rhythms and reproduction, (ii) Structure and functions of hypothalamus and hypothalamic nuclei, regulation of neuro-endocrine glands, feedback mechanisms, (iii) Structure of pituitary gland, hormones and their functions, hypothalamo-hypophysial portal system, disorders of pituitary gland. **Practical (Full marks = 15)** 1. Study of animal house: set up and maintenance of basic animal house, breeding techniques, care taken for normal and experimental animals. 2. Examination of vaginal smear rats from live animals (Subject to UGC guideline). 3. Tissue fixation, embedding in paraffin, microtomy and slide preparation of any endocrine gland (Subject to UGC guideline). 4. Examination of sections of mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid (Subject to UGC guideline). 5. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, Fallopian tube, Uterus (Subject to UGC guideline).	45
	5TH SEMESTER (Gen)		DSE1A:CellBiologyandAnimal Biotechnology(=50 marks), Group A: Cell Biology (=12.5 marks) Unit 1: Cell types- Prokaryotic and eukaryotic cell Unit 2: Plasma membrane- Structure (Fluid mosaic	9

			model) and function of plasma membrane. Practical (=15 marks) i. Genomic DNA isolation from E.coli. ii. Plasmid DNA isolation (pUC 18/19) from E.coli	
2				
Oct22-Dec22	1ST SEMESTER (HONS.)		ZOOL DC2: Non-Chordates II (Coelomates) Unit 4: Onychophora: General characteristics and evolutionary significance. Unit 5: Mollusca: General characteristics and classification up to classes; Nervous system and torsion in Gastropoda; Feeding and respiration in Pila sp.	18
	1ST SEMESTER (Gen)		Discipline Core (DC): Zoology for General Studies (A1)DC 1: Animal Diversity and Ecology Theory[(A1)-ZOOL-G-DC 1-T]: Unit 7: Aschelminthes - General characteristics and classification up to classes, life cycle, and pathogenicity and control measures of Ascaris lumbricoides; Parasitic adaptation of Ascaris sp. Unit 8: Annelida - General characteristics and classification up to classes, Excretion in Annelida. Unit 9: Arthropoda - General characteristics and classification up to classes, Respiration in arthropoda (gills in prawn and trachea in cockroach). Unit 10: Onychophora- General characteristics, body structure and evolutionary significance. Unit 11: Mollusca: General characteristics and classification up to classes, Nervous system and torsion in gastropod; feeding and respiration in Pila sp. Page 5 of 23 Unit 12: Echinodermata: General characteristics and classification up to classes; water-vascular system in Asteroidea. Unit 13: Hemichordata: General characteristics of phylum Hemichordata; relationship with non-chordates and chordates.	18
	3RD SEMESTER (HONS.)		ZOOL DC5 Unit 3: Mutations- (i) Types of gene mutations (classification), types of chromosomal aberrations (classification with one suitable example of each), (ii) Non-disjunction and variation in chromosome number Unit 4: Sex Determination: (i)Mechanisms of sex determination in Drosophila, (ii) Sex determination in human, (iii) Dosage compensation in Drosophila & human Unit 5: Extra-chromosomal Inheritance and Maternal effect- (i) Criteria for extra chromosomal inheritance, (ii) Kappa particle in Paramoecium, (iii) Shell spiralling in snail. ZOOL-H-DC5-P Identification of chromosomal aberration in Drosophila and human (by photograph). Identification of various mutants of Drosophila. (by photographs only) Linkage maps based on data from crosses of Drosophila.(based on the three point test crosses) Pedigree analysis of some human inherited trait from the supplied data. Study of human karyotype (Subject to UGC guideline).	45

			Test for colour blindness in human from provided diagrams/ charts.	
	3RD SEMESTER (Gen)		(A3)DC7 Physiology and Biochemistry Unit 3: Respiratory Physiology: Ventilation, external and internal respiration, transport of oxygen and carbon dioxide in blood. Unit 4: Renal Physiology: Functional anatomy of kidney, Mechanism of urine formation.	18
	5TH SEMESTER (Hons)		**ZOOL DC11: Histology and Endocrinology** Unit 4: Epiphysis, Hypothalamo-hypophysial Axis-(i) Structure of pineal gland, secretions and their functions in biological rhythms and reproduction, (ii) Structure and functions of hypothalamus and hypothalamic nuclei, regulation of neuro-endocrine glands, feedback mechanisms, (iii) Structure of pituitary gland, hormones and their functions, hypothalamo-hypophysial portal system, disorders of pituitary gland. Unit 5: Peripheral Endocrine Glands-(i) Structure, hormones, functions and regulation of thyroid gland, parathyroid, adrenal, pancreas, ovary and testis, (ii) Hormones in homeostasis, disorders of endocrine glands **Practical (=15 marks)** 4. Examination of sections of mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid (Subject to UGC guideline). 5. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, Fallopian tube, Uterus (Subject to UGC guideline). 6. Double staining of prepared histological slides (Subject to UGC guideline)	45
	5TH SEMESTER (Gen)		**DSE1A:CellBiologyandAnimal Biotechnology(=50 marks), Group A: Cell Biology (=12.5 marks)** Unit 2: Plasma membrane- Structure (Fluid mosaic model) and function of plasma membrane. Unit3: Cell organelles- Structure and function of Mitochondria, Nucleus, Golgi complex, ER, Ribosomes. **Practical (=15 marks)** iv. To study following techniques through photographs: (i) Southern Blotting,(ii) Northern Blotting, (iii)Western Blotting, (iv) DNA Sequencing (Sanger's Method) Page 14 of 23 PCR, (v) DNA fingerprinting. v. Seminar on tools and techniques of Biotechnology. vi. Study/ Identification of different stages of mitosis and meiosis.	9
3				
Jan23-March23	2nd SEMESTER (HONS.)		DC3 **Unit 7: Reptilia: (**i) General characteristics and classification up to living Orders. (Young 1981),(ii) Poison apparatus and biting mechanism in snake, snake venom and method of treatment of snake biting,(ii) *Sphenodon*- present status **Unit 8: Aves: (i)** General characteristics and classification up to Sub-Classes. (Young, 1981), (ii) Exoskeleton and migration in birds, (ii) Principles and aerodynamics of flight, (iv) *Archaeopteryx*-a connecting link.	18

	2nd SEMESTER (Gen)		**DC4** Unit 4: Circulatory System- General plan of circulation, comparative account of heart and aortic arches. Unit 5: Urinogenital System- Succession of kidney, Evolution of urinogenital ducts. DC4P i. **Study** of placoid, cycloid and ctenoid scales through permanent slides/photographs. ii. **Study** of disarticulated skeleton of toad, pigeon, fowl, guineapig and rabbit. iii. **Demonstration** of carapace and plastron of turtle.	18
	4th SEMESTER (HONS.)		**DC9** Unit 7: Physiology of Heart - Structure of mammalian heart, coronary circulation, structure and working of conducting myocardial fibres, origin and conduction of cardiac impulses; ECG, cardiac cycle and cardiac output; blood pressure and its regulation Unit 8: Thermoregulation & Osmoregulation - Physiological classification based on thermal biology; thermoregulation of homeotherms; osmoregulation in aquatic vertebrates; extra renal osmoregulatory organs in vertebrates. Unit 9: Renal Physiology - Histology of kidney and nephrons, mechanism of urine formation, glomerular filtration, tubular secretion, plasma clearance and counter current mechanism	45
	4th SEMESTER (Gen)		DC10 Grp-B Unit 1: Life's Beginnings- Origin of life, Chemogeny Unit 2: Theory and concept of evolution - Historical review of evolutionary concepts, Lamarkism, Darwinism and Neo-Darwinism, Geological time scale, evolution of Horse.	18
	6TH SEMESTER (Hons)		**ZOOL DC13: Parasitology and Immunology, Group A: Parasitology (=12.5 marks)** Unit 1: Introduction to parasitology- Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship. Unit 2: Parasitic Protists: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani. **Group A : Laboratory Experimentation** 1. Study of life stages of Giardia intestinalis, Trypanosoma gambiense and Leishmania donovani through permanent slides/micro photographs. 2. Study of adult and life stages of Schistosoma haematobium and Taenia saginata through permanent slides/micro photographs. 3. Study of adult and life stages of Ancylostoma duodenale, Brugia malayi and Trichinella spiralis through permanent slides/micro photographs. 4. Study of Pediculus humanus, Xenopsylla cheopis and Cimex lectularius **ZOOL DSE: 2 Biostatistics (OR) Bioinformatics** 1. Basic idea on variables, frequency distribution and sampling. 2. Measures of central tendency: mean, median, mode. 3. Measures of distributions: variance, standard deviation and standard error— problems and application	45

			Practical (=15 marks) 1. Frequency distribution, bar diagram, histogram, Pie diagram, Cumulative frequency curve, Principal Component analysis, Correlation matrix	
	6TH SEMESTER (Gen)		**DSE 4A: Aquatic Biology(=50 marks)** Unit 1: Aquatic Biomes- Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, and coral reefs. Unit 2: Freshwater Biology- (i) Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico–chemical Characteristics: Light, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; dissolved gases (Oxygen, Carbon dioxide). (ii) Streams: Different stages of stream development, Physico-chemical environment, **Practical (=15 marks)** i. Determine the area of a lake using graphimetric and gravimetric method. ii. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.	9
4				
April23-June23	2nd SEMESTER (HONS.)		DC3: Unit 9: Mammals: (i) General characters and classification up to living Infra class (Young,1981), (ii) Affinities of Prototheria, (iii) Adaptive radiation in mammals with reference to locomotory appendages, (iv) Echolocation in Chiropterans and Cetaceans. DC3P iv. Amphibia: Necturus, Bufo, Rana, Hyla, Alytes, Axoltl, Tylototriton, Ambystoma. v. Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Crocodylus; Key for identification of poisonous and non-poisonous snakes. vi. Mammalia: Bat (insectivorous and frugivorous), Funambulus.	18
	2nd SEMESTER (Gen)		DC4 **Unit 6: Nervous System-** Comparative account of brain, cranial nerves in mammals. **Unit 7: Skeletal System-** Evolution of visceral arches. DC4P Grp-A iv. Identification of mammalian skulls*: Bufo, Rana, Columba, Cavia* and Dog.	18
	4th SEMESTER (HONS.)		DC10 Grp-A Unit 1: Definition of taxonomy, micro- and macro taxonomy, systematic, Linnean hierarchy, cladistics, hierarchy, taxonomic types Unit 2: Principles of Binomial nomenclature. Unit 3: Species concept: Types and modes, type concept, primary and secondary types-definition and application.	45
	4th SEMESTER (Gen)		DC10 Grp-B Unit 3: Sources of variations - Types of variations and their role in evolution	18

			Unit 4: Population genetics - Hardy-Weinberg law, Natural selection; Genetic drift mechanism (Founder's effect, Bottleneck phenomenon);	
	6TH SEMESTER (Hons)		**ZOOL DSE: 2 Biostatistics (OR) Bioinformatics** 4. Test of significance: t-test, ANOVA, Chi-square test. 5. Correlation and regression analysis. 6. Probability distribution and significance. **Practical (=15 marks)** 2. Chi-square test, t-test, ANOVA, Correlation analysis from data provided. **ZOOL DC13: Parasitology and Immunology, Group A: Parasitology (=12.5 marks)** Unit 3: Parasitic Platyhelminthes: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Schistosoma haematobium, Taenia saginata. Unit 4: Parasitic Nematodes: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Ancylostoma duodenale, and Trichinella spiralis, Brugia malayi, Meloidogyne incognita, Heterodera rostochiensis-Life-Cycle, symptoms and control. **Practical (=15 marks)** Unit 5: Parasitic Arthropods: Biology, importance and control of Ticks, Mites, Lice, Flea and Bug Practical (=15 marks) 5. Study of nematode/cestode parasites from the intestines of Poultry bird (Intestine can be procured from poultry/market as a by-product). 6. Submission of a brief report on parasitic vertebrates. 7. Study of rectal parasites of Periplaneta sp. / Bufo sp. 8. Demonstration of lymphoid organs. 9. Histological study of spleen, thymus and lymph nodes through slides/ photographs 10. Preparation of stained blood film to study various types of blood cells. 11. Antigen antibody reaction by immune-diffusion. 12. Demonstration of ELISA. 13. Determination of human blood group	45
	6TH SEMESTER (Gen)		**DSE 4A: Aquatic Biology(=50 marks)** Unit 3: Marine Biology- Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Unit 4: Management of Aquatic Resources- Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD. **Practical (=15 marks)** iv. Observation on the Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance. v. A Project Report on a visit to a Sewage treatment plant/Marine bio-reserve/ Fisheries Institutes/ any aquatic habitat/ aquaculture farm.	9

ACADEMIC QUARTER	CLASS	NAME OF THE TEACHER	TOPIC TO BE COVERED	NO OF LECTURES
JULY 22, TO SEPTEMBER 22	1ST SEMESTER (HONS.)	**Sanchita Chakraborty** HONS. (THEORY+ PRACTICAL) GENERAL (THEORY+ PRACTICAL) SYLLABUS TOPICS ARE TO BE ALLOTED	**ZOOL DC1:Non-Chordates I (Protists to Pseudo-coelomates)** Unit 1: Basics of Animal Classification: Six kingdom concept of classification (Carl Woese) Unit 2: Protista: General characteristics and classification up to phylum; Locomotion in Euglena, Paramoecium and Amoeba; Conjugation in Paramoecium; Life cycle and pathogenicity of Plasmodium vivax and Entamoeba histolytica.	10
	1ST SEMESTER (Gen)		**Discipline Core Courses (DC): Zoology for General Studies** **(A1)DC 1: Animal Diversity and Ecology Theory[(A1)-ZOOL-G-DC 1-T]:** **Group A: Biology of Non-Chordates(=10 marks)** **Unit 1: Basics of Animal Classification -** Six kingdom concept of classification (**Carl Woese).** **Unit 4: Cnidaria -** General characteristics and classification up to classes, metagenesis in *Obelia*; corals and coral reef diversity, functions & conservation. **Unit 5: Ctenophora -** General characteristics and classification up to class.	10
	3RD SEMESTER (HONS.)		**ZOOL DC5: Cell Biology and Principles of Genetics** **Group B: Principles of Genetics** **Unit 1: Mendelian Genetics and its Extension-(i)** Principles of inheritance, incomplete dominance and co-dominance, multiple alleles (with special reference to blood group), lethal alleles, pleiotropy, gene interactions, . **Group B: Principles of Genetics** **Unit 2: Linkage, Crossing Over and Chromosomal Mapping-**Linkage, somatic crossing over, cytological basis of crossing over, molecular mechanism of crossing over.	10
	3RD SEMESTER (Gen)		**(A3)DC7 Physiology and Biochemistry** **Group A: Physiology (= 12.5 marks)** **Unit 1: Digestion and Absorption of Food-** Digestion and absorption of carbohydrates, fats and proteins. **Unit 2: Functioning of Excitable Tissue (Nerve and Muscle):** Structure of neuron, Propagation of nerve impulse (myelinated and non-myelinated nerve fibre); structure of	10

			skeletal muscle, Mechanism of muscle contraction, Neuromuscular junction, Synaptic transmission. Practical Group A: Experimentation Physiology	
	5th SEMESTER (Hons)		**ZOOL DC11: Histology and Endocrinology** Unit1: Muscular system-Histology of different types of muscle, Ultra structure of skeletal muscle. Unit:2: Histo-architechture of liver and its function. Unit 3: Introduction to Endocrinology- General idea of endocrine systems, classification, characteristic and transport of hormones, neurosecretions and neurohormones. **Practical (Full marks = 15)** 1. Study of animal house: set up and maintenance of basic animal house, breeding techniques, care taken for normal and experimental animals.	10
	5TH SEMESTER (Gen)		DSE1A:CellBiologyandAnimal Biotechnology(=50 marks), Group A: Cell Biology (=12.5 marks) Unit 1: Cell types- Prokaryotic and eukaryotic cell Unit 2: Plasma membrane- Structure (Fluid mosaic model) and function of plasma membrane. 1. Study of animal house: set up and maintenance of basic animal house, breeding techniques, care taken for normal and experimental animals. 2. Examination of vaginal smear rats from live animals (Subject to UGC guideline).	10
2				
Oct22-Dec22	1ST SEMESTER (HONS.)		ZOOL DC2: Non-Chordates II (Coelomates) Unit 4: Onychophora: General characteristics and evolutionary significance.	10
	1ST SEMESTER (Gen)		Discipline Core (DC): Zoology for General Studies (A1)DC 1: Animal Diversity and Ecology Theory[(A1)-ZOOL-G-DC 1-T]: Unit 7: Aschelminthes - General characteristics and classification up to classes, life cycle, and pathogenicity and control measures of Ascaris lumbricoides; Parasitic adaptation of Ascaris sp. Unit 8: Annelida - General characteristics and classification up to classes, Excretion in Annelida. \Unit 10: Onychophora- General characteristics, body structure and evolutionary significance. Unit 11: Mollusca: General characteristics and classification up to classes, Nervous system and torsion in gastropod; feeding and respiration in Pila sp.	10

	3RD SEMESTER (HONS.)		ZOOL DC5 Unit 3: Mutations- (i) Types of gene mutations (classification), types of chromosomal aberrations (classification with one suitable example of each), (ii) Non-disjunction and variation in chromosome number ZOOL-H-DC5-P Identification of chromosomal aberration in Drosophila and human (by photograph). Identification of various mutants of Drosophila. (by photographs only) Linkage maps based on data from crosses of Drosophila.(based on the three point test crosses)	10
	3RD SEMESTER (Gen)		(A3)DC7 Physiology and Biochemistry Unit 3: Respiratory Physiology: Ventilation, external and internal respiration, transport of oxygen and carbon dioxide in blood. Unit 4: Renal Physiology: Functional anatomy of kidney, Mechanism of urine formation.	10
	5TH SEMESTER (Hons)		**ZOOL DC11: Histology and Endocrinology** Unit 4: Epiphysis, Hypothalamo-hypophysial Axis-(i) Structure of pineal gland, secretions and their functions in biological rhythms and reproduction, (ii) Structure and functions of hypothalamus and hypothalamic nuclei, regulation of neuro-endocrine glands, feedback mechanisms, (iii) Structure of pituitary gland, hormones and their functions, hypothalamo-hypophysial portal system, disorders of pituitary gland. **Practical (=15 marks)** 4. Examination of sections of mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid (Subject to UGC guideline). 5. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, Fallopian tube,	10
	5TH SEMESTER (Gen)		**DSE1A:CellBiologyandAnimal Biotechnology(=50 marks), Group A: Cell Biology (=12.5 marks)** Unit 2: Plasma membrane- Structure (Fluid mosaic model) and function of plasma membrane. Unit3: Cell organelles- Structure and function of Mitochondria, Nucleus, Golgi complex, ER, Ribosomes. **Practical (=15 marks)** iv. To study following techniques through photographs: (i) Southern Blotting,(ii) Northern Blotting, (iii)Western Blotting, (iv) DNA Sequencing (Sanger's Method) Page 14 of 23 PCR, (v) DNA fingerprinting. v. Seminar on tools and techniques of Biotechnology. vi. Study/ Identification of different stages of mitosis and meiosis.	10
3				

Jan23-March23	2nd SEMESTER (HONS.)		DC3 **Unit 7: Reptilia: (**i) General characteristics and classification up to living Orders. (Young 1981),(ii) Poison apparatus and biting mechanism in snake, snake venom and method of treatment of snake biting,(ii) *Sphenodon*- present status **Unit 8: Aves: (i)** General characteristics and classification up to Sub-Classes. (Young, 1981), (ii) Exoskeleton and migration in birds, (ii) Principles and aerodynamics of flight, (iv) *Archaeopteryx*-a connecting link.	10
	2nd SEMESTER (Gen)		**DC4** Unit 4: Circulatory System- General plan of circulation, comparative account of heart and aortic arches. Unit 5: Urinogenital System- Succession of kidney, Evolution of urinogenital ducts. DC4P i. **Study** of placoid, cycloid and ctenoid scales through permanent slides/photographs. ii. **Study** of disarticulated skeleton of toad, pigeon, fowl, guineapig and rabbit. iii. **Demonstration** of carapace and plastron of turtle.	10
	4th SEMESTER (HONS.)		**DC9** Unit 7: Physiology of Heart - Structure of mammalian heart, coronary circulation, structure and working of conducting myocardial fibres, origin and conduction of cardiac impulses; ECG, cardiac cycle and cardiac output; blood pressure and its regulation Unit 8: Thermoregulation & Osmoregulation - Physiological classification based on thermal biology; Unit 9: Renal Physiology - Histology of kidney and nephrons, mechanism of urine formation, glomerular filtration, tubular secretion, plasma clearance and counter current mechanism	10
	4th SEMESTER (Gen)		DC10 Grp-B Unit 1: Life's Beginnings- Origin of life, Chemogeny Unit 2: Theory and concept of evolution - Historical review of evolutionary concepts, Lamarkism, Darwinism and Neo-Darwinism, Geological time scale, evolution of Horse.	10
	6TH SEMESTER (Hons)		**ZOOL DC13: Parasitology and Immunology, Group A: Parasitology (=12.5 marks)** Unit 1: Introduction to parasitology- Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship. Unit 2: Parasitic Protists: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani. **Group A : Laboratory Experimentation** 1. Study of life stages of Giardia intestinalis, Trypanosoma gambiense and Leishmania	10

			donovani through permanent slides/micro photographs. 2. Study of adult and life stages of Schistosoma haematobium and Taenia saginata through permanent slides/micro photographs. **ZOOL DSE: 2 Biostatistics (OR) Bioinformatics** 1. Basic idea on variables, frequency distribution and sampling. 2. Measures of central tendency: mean, median, mode. 3. Measures of distributions: variance, standard deviation and standard error—problems and application	
	6TH SEMESTER (Gen)		**DSE 4A: Aquatic Biology(=50 marks)** Unit 1: Aquatic Biomes- Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, and coral reefs. Unit 2: Freshwater Biology- (i) Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico–chemical Characteristics: Light, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates,	10
4				
April23-June23	2nd SEMESTER (HONS.)		DC3: Unit 9: Mammals: (i) General characters and classification up to living Infra class (Young,1981), (ii) Affinities of Prototheria, (iii) Adaptive radiation in mammals with reference to locomotory appendages, (iv) Echolocation in Chiropterans and Cetaceans. DC3P iv. Amphibia: Necturus, Bufo, Rana, Hyla, Alytes, Axoltl, Tylototriton, Ambystoma.	10
	2nd SEMESTER (Gen)		DC4 **Unit 6: Nervous System-** Comparative account of brain, cranial nerves in mammals. **Unit 7: Skeletal System-** Evolution of visceral arches.	10
	4th SEMESTER (HONS.)		DC10 Grp-A Unit 1: Definition of taxonomy, micro- and macro taxonomy, systematic, Linnean hierarchy, cladistics, hierarchy, taxonomic types	10
	4th SEMESTER (Gen)		DC10 Grp-B Unit 3: Sources of variations - Types of variations and their role in evolution Unit 4: Population genetics - Hardy-Weinberg law, Natural selection; Genetic drift mechanism (Founder's effect, Bottleneck phenomenon);	10
	6TH SEMESTER (Hons)		**ZOOL DSE: 2 Biostatistics (OR) Bioinformatics** 4. Test of significance: t-test, ANOVA, Chi-square test. 5. Correlation and regression analysis. 6. Probability distribution and significance. **Practical (=15 marks)**	10

			2. Chi-square test, t-test, ANOVA, Correlation analysis from data provided. **ZOOL DC13: Parasitology and Immunology, Group A: Parasitology (=12.5 marks)** Unit 3: Parasitic Platyhelminthes: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Schistosoma haematobium, Taenia saginata. **Practical (=15 marks)** Unit 5: Parasitic Arthropods: Biology, importance and control of Ticks, Mites, Lice, Flea and Bug	
	6^{TH} SEMESTER (Gen)		**DSE 4A: Aquatic Biology(=50 marks)** Unit 3: Marine Biology- Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Unit 4: Management of Aquatic Resources- Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD.	10

ACADEMIC QUARTER	CLASS	NAME OF THE TEACHER	TOPIC TO BE COVERED	NO OF LECTURES
JULY 22, TO SEPTEMBER 22	1ST SEMESTER (HONS.)	**Md Nazir Hossain** HONS. (THEORY+ PRACTICAL) GENERAL (THEORY+ PRACTICAL) SYLLABUS TOPICS ARE TO BE ALLOTED	**ZOOL DC1:Non-Chordates I (Protists to Pseudo-coelomates)** Unit 1: Basics of Animal Classification: Six kingdom concept of classification (Carl Woese) Unit 2: Protista: General characteristics and classification up to phylum; Locomotion in Euglena, Paramoecium and Amoeba; Conjugation in Paramoecium; Life cycle and pathogenicity of Plasmodium vivax and Entamoeba histolytica. **Unit 7: Nemathelminthes:** General characteristics and classification up to classes; Life cycle, pathogenicity, parasitic adaptations and control measures of *Ascaris lumbricoides* and *Wuchereria bancrofti*	18
	1ST SEMESTER (Gen)		**Discipline Core Courses (DC): Zoology for General Studies** **(A1)DC 1: Animal Diversity and Ecology** **Theory[(A1)-ZOOL-G-DC 1-T]:** **Group A: Biology of Non-Chordates(=10 marks)** **Unit 1: Basics of Animal Classification -** Six kingdom concept of classification (**Carl Woese).** **Unit 2: Protista and Metazoa -** Protozoa-general characteristics and classification up to phylum, locomotion in *Euglena*, *Paramoecium* and *Amoeba*, conjugation in *Paramoecium*. **Unit 3: Porifera -** General characteristics and classification up to classes, canal system in sponges. **Unit 4: Cnidaria -** General characteristics and classification up to classes, metagenesis in *Obelia*; corals and coral reef diversity, functions & conservation. **Unit 5: Ctenophora -** General characteristics and classification up to class.	18
	3RD SEMESTER (HONS.)		**ZOOL DC5: Cell Biology and Principles of Genetics** **Group B: Principles of Genetics** **Unit 1: Mendelian Genetics and its Extension-(i)** Principles of inheritance, incomplete dominance and co-dominance, multiple alleles (with special reference to blood group), lethal alleles, pleiotropy, gene interactions, (ii) Sex-linked, sex-influenced and sex-limited inheritance, polygenic inheritance (brief idea). . **Group B: Principles of Genetics** **Unit 1: Mendelian Genetics and its Extension-(i)** Principles of inheritance, incomplete dominance and co-dominance, multiple alleles (with special reference to blood group), lethal alleles, pleiotropy, gene interactions, (ii) Sex-linked, sex-influenced and sex-limited inheritance, polygenic inheritance (brief idea). **Unit 2: Linkage, Crossing Over and Chromosomal Mapping-**Linkage, somatic crossing over, cytological basis of crossing over, molecular mechanism of crossing over.	45
	3RD SEMESTER		**(A3)DC7 Physiology and Biochemistry**	18

	(Gen)		**Group A: Physiology (= 12.5 marks)** **Unit 1: Digestion and Absorption of Food-** Digestion and absorption of carbohydrates, fats and proteins. **Unit 2: Functioning of Excitable Tissue (Nerve and Muscle):** Structure of neuron, Propagation of nerve impulse (myelinated and non-myelinated nerve fibre); structure of skeletal muscle, Mechanism of muscle contraction, Neuromuscular junction, Synaptic transmission. Practical Group A: Experimentation Physiology i. Preparation of temporary mounts: Blood film. iii. Estimation of haemoglobin using Sahli's haemoglobinometer.	
	5th SEMESTER (Hons)		**ZOOL DC11: Histology and Endocrinology** Unit1: Muscular system-Histology of different types of muscle, Ultra structure of skeletal muscle. Unit:2: Histo-architechture of liver and its function. Unit 3: Introduction to Endocrinology- General idea of endocrine systems, classification, characteristic and transport of hormones, neurosecretions and neurohormones. **Practical (Full marks = 15)** 1. Study of animal house: set up and maintenance of basic animal house, breeding techniques, care taken for normal and experimental animals. 2. Examination of vaginal smear rats from live animals (Subject to UGC guideline). 3. Tissue fixation, embedding in paraffin, microtomy and slide preparation of any endocrine gland (Subject to UGC guideline).	18
	5TH SEMESTER (Gen)		DSE1A:CellBiologyandAnimal Biotechnology(=50 marks), Group A: Cell Biology (=12.5 marks) Unit 1: Cell types- Prokaryotic and eukaryotic cell Unit 2: Plasma membrane- Structure (Fluid mosaic model) and function of plasma membrane. 1. Study of animal house: set up and maintenance of basic animal house, breeding techniques, care taken for normal and experimental animals. 2. Examination of vaginal smear rats from live animals (Subject to UGC guideline). 3. Tissue fixation, embedding in paraffin, microtomy and slide preparation of any endocrine gland (Subject to UGC guideline). Practical (=15 marks) i. Genomic DNA isolation from E.coli. ii. Plasmid DNA isolation (pUC 18/19) from E.coli	18
2				
Oct22-Dec22	1ST SEMESTER (HONS.)		ZOOL DC2: Non-Chordates II (Coelomates) Unit 4: Onychophora: General characteristics and evolutionary significance. Unit 5: Mollusca: General characteristics and classification up to classes; Nervous system and torsion in Gastropoda; Feeding and respiration in Pila sp.	18
	1ST SEMESTER (Gen)		Discipline Core (DC): Zoology for General Studies (A1)DC 1: Animal Diversity and Ecology	18

			Theory[(A1)-ZOOL-G-DC 1-T]: Unit 7: Aschelminthes - General characteristics and classification up to classes, life cycle, and pathogenicity and control measures of Ascaris lumbricoides; Parasitic adaptation of Ascaris sp. Unit 8: Annelida - General characteristics and classification up to classes, Excretion in Annelida. Unit 9: Arthropoda - General characteristics and classification up to classes, Respiration in arthropoda (gills in prawn and trachea in cockroach). Unit 10: Onychophora- General characteristics, body structure and evolutionary significance. Unit 11: Mollusca: General characteristics and classification up to classes, Nervous system and torsion in gastropod; feeding and respiration in Pila sp.	
	3RD SEMESTER (HONS.)		ZOOL DC5 Unit 3: Mutations- (i) Types of gene mutations (classification), types of chromosomal aberrations (classification with one suitable example of each), (ii) Non-disjunction and variation in chromosome number Unit 4: Sex Determination: (i)Mechanisms of sex determination in Drosophila, (ii) Sex determination in human, (iii) Dosage compensation in Drosophila & human Unit 5: Extra-chromosomal Inheritance and Maternal effect- (i) Criteria for extra chromosomal inheritance, (ii) Kappa particle in Paramoecium, (iii) Shell spiralling in snail. ZOOL-H-DC5-P Identification of chromosomal aberration in Drosophila and human (by photograph). Identification of various mutants of Drosophila. (by photographs only) Linkage maps based on data from crosses of Drosophila.(based on the three point test crosses)	45
	3RD SEMESTER (Gen)		(A3)DC7 Physiology and Biochemistry Unit 3: Respiratory Physiology: Ventilation, external and internal respiration, transport of oxygen and carbon dioxide in blood. Unit 4: Renal Physiology: Functional anatomy of kidney, Mechanism of urine formation.	18
	5TH SEMESTER (Hons)		**ZOOL DC11: Histology and Endocrinology** Unit 4: Epiphysis, Hypothalamo-hypophysial Axis-(i) Structure of pineal gland, secretions and their functions in biological rhythms and reproduction, (ii) Structure and functions of hypothalamus and hypothalamic nuclei, regulation of neuro-endocrine glands, feedback mechanisms, (iii) Structure of pituitary gland, hormones and their functions, hypothalamo-hypophysial portal system, disorders of pituitary gland. **Practical (=15 marks)** 4. Examination of sections of mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid (Subject to UGC guideline). 5. Examination of histological sections from photomicrographs/ permanent slides of rat/human:	45

			testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, Fallopian tube,	
	5TH SEMESTER (Gen)		**DSE1A:CellBiologyandAnimal Biotechnology(=50 marks), Group A: Cell Biology (=12.5 marks)** Unit 2: Plasma membrane- Structure (Fluid mosaic model) and function of plasma membrane. Unit3: Cell organelles- Structure and function of Mitochondria, Nucleus, Golgi complex, ER, Ribosomes. **Practical (=15 marks)** iv. To study following techniques through photographs: (i) Southern Blotting,(ii) Northern Blotting, (iii)Western Blotting, (iv) DNA Sequencing (Sanger's Method) Page 14 of 23 PCR, (v) DNA fingerprinting. v. Seminar on tools and techniques of Biotechnology. vi. Study/ Identification of different stages of mitosis and meiosis.	18
3				
Jan23-March23	2nd SEMESTER (HONS.)		DC3 **Unit 7: Reptilia: (**i) General characteristics and classification up to living Orders. (Young 1981),(ii) Poison apparatus and biting mechanism in snake, snake venom and method of treatment of snake biting,(ii) *Sphenodon*- present status **Unit 8: Aves: (i)** General characteristics and classification up to Sub-Classes. (Young, 1981), (ii) Exoskeleton and migration in birds, (ii) Principles and aerodynamics of flight, (iv) *Archaeopteryx*-a connecting link.	18
	2nd SEMESTER (Gen)		**DC4** Unit 4: Circulatory System- General plan of circulation, comparative account of heart and aortic arches. Unit 5: Urinogenital System- Succession of kidney, Evolution of urinogenital ducts. DC4P i. **Study** of placoid, cycloid and ctenoid scales through permanent slides/photographs. ii. **Study** of disarticulated skeleton of toad, pigeon, fowl, guineapig and rabbit. iii. **Demonstration** of carapace and plastron of turtle.	18
	4th SEMESTER (HONS.)		**DC9** Unit 7: Physiology of Heart - Structure of mammalian heart, coronary circulation, structure and working of conducting myocardial fibres, origin and conduction of cardiac impulses; ECG, cardiac cycle and cardiac output; blood pressure and its regulation Unit 8: Thermoregulation & Osmoregulation - Physiological classification based on thermal biology; Unit 9: Renal Physiology - Histology of kidney and nephrons, mechanism of urine formation, glomerular filtration, tubular secretion, plasma clearance and counter current mechanism	18
	4th SEMESTER (Gen)		DC10 Grp-B Unit 1: Life's Beginnings- Origin of life, Chemogeny Unit 2: Theory and concept of evolution - Historical review of evolutionary concepts, Lamarkism, Darwinism and Neo-Darwinism, Geological time scale, evolution of Horse.	18
	6TH SEMESTER (Hons)		**ZOOL DC13: Parasitology and Immunology, Group A: Parasitology (=12.5 marks)**	18

			Unit 1: Introduction to parasitology- Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship. Unit 2: Parasitic Protists: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani. **Group A : Laboratory Experimentation** 1. Study of life stages of Giardia intestinalis, Trypanosoma gambiense and Leishmania donovani through permanent slides/micro photographs. 2. Study of adult and life stages of Schistosoma haematobium and Taenia saginata through permanent slides/micro photographs. **ZOOL DSE: 2 Biostatistics (OR) Bioinformatics** 1. Basic idea on variables, frequency distribution and sampling. 2. Measures of central tendency: mean, median, mode. 3. Measures of distributions: variance, standard deviation and standard error— problems and application **Practical (=15 marks)** 1. Frequency distribution, bar diagram, histogram, Pie diagram, Cumulative frequency curve, Principal Component analysis, Correlation matrix	
	6TH SEMESTER (Gen)		**DSE 4A: Aquatic Biology(=50 marks)** Unit 1: Aquatic Biomes- Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, and coral reefs. Unit 2: Freshwater Biology- (i) Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico–chemical Characteristics: Light, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, **Practical (=15 marks)** i. Determine the area of a lake using graphimetric and gravimetric method. ii. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.	18
4				
April23-June23	2nd SEMESTER (HONS.)		DC3: Unit 9: Mammals: (i) General characters and classification up to living Infra class (Young,1981), (ii) Affinities of Prototheria, (iii) Adaptive radiation in mammals with reference to locomotory appendages, (iv) Echolocation in Chiropterans and Cetaceans. DC3P iv. Amphibia: Necturus, Bufo, Rana, Hyla, Alytes, Axoltl, Tylototriton, Ambystoma. v. Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Crocodylus; Key for identification of poisonous and non-poisonous snakes. vi. Mammalia: Bat (insectivorous and frugivorous), Funambulus.	18

	2nd SEMESTER (Gen)		DC4 **Unit 6: Nervous System-** Comparative account of brain, cranial nerves in mammals. **Unit 7: Skeletal System-** Evolution of visceral arches. DC4P Grp-A iv. Identification of mammalian skulls*: Bufo, Rana, Columba, Cavia* and Dog.	18
	4th SEMESTER (HONS.)		DC10 Grp-A Unit 1: Definition of taxonomy, micro- and macro taxonomy, systematic, Linnean hierarchy, cladistics, hierarchy, taxonomic types Unit 2: Principles of Binomial nomenclature. Unit 3: Species concept: Types and modes, type concept, primary and secondary types-definition and application.	18
	4th SEMESTER (Gen)		DC10 Grp-B Unit 3: Sources of variations - Types of variations and their role in evolution Unit 4: Population genetics - Hardy-Weinberg law, Natural selection; Genetic drift mechanism (Founder's effect, Bottleneck phenomenon);	18
	6TH SEMESTER (Hons)		**ZOOL DSE: 2 Biostatistics (OR) Bioinformatics** 4. Test of significance: t-test, ANOVA, Chi-square test. 5. Correlation and regression analysis. 6. Probability distribution and significance. **Practical (=15 marks)** 2. Chi-square test, t-test, ANOVA, Correlation analysis from data provided. **ZOOL DC13: Parasitology and Immunology, Group A: Parasitology (=12.5 marks)** Unit 3: Parasitic Platyhelminthes: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Schistosoma haematobium, Taenia saginata. **Practical (=15 marks)** Unit 5: Parasitic Arthropods: Biology, importance and control of Ticks, Mites, Lice, Flea and Bug Practical (=15 marks) 5. Study of nematode/cestode parasites from the intestines of Poultry bird (Intestine can be procured from poultry/market as a by-product). 6. Submission of a brief report on parasitic vertebrates. 7. Study of rectal parasites of Periplaneta sp. / Bufo sp. 8. Demonstration of lymphoid organs. 9. Histological study of spleen, thymus and lymph nodes through slides/ photographs 10. Preparation of stained blood film to study various types of blood cells.	18
	6TH SEMESTER (Gen)		**DSE 4A: Aquatic Biology(=50 marks)** Unit 3: Marine Biology- Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Unit 4: Management of Aquatic Resources- Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD. **Practical (=15 marks)** iv. Observation on the Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their	18

			significance. v. A Project Report on a visit to a Sewage treatment plant/Marine bio-reserve/ Fisheries Institutes/ any aquatic habitat/ aquaculture farm.	

ACADEMIC QUARTER	CLASS	NAME OF THE TEACHER	TOPIC TO BE COVERED	NO OF LECTURES
JULY 22, TO SEPTEMBER 22	1ST SEMESTER (HONS.)	TITU KARMAKAR HONS. (THEORY+ PRACTICAL) GENERAL (THEORY+ PRACTICAL) SYLLABUS TOPICS ARE TO BE ALLOTED	**ZOOL DC2: Non-Chordates II (Coelomates)** Unit 1: Introduction: Evolution of coelom and metamerism. Unit 2: Annelida: General characteristics and classification up to classes: Type study of Pheretima sp. (morphology, locomotion, circulation and reproduction), Excretion in Annelida. • **Practical (Full marks = 15) [ZOOL-H-DC2-P]** 1. Study of following specimens: a. Annelids - Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria	18
	1ST SEMESTER (Gen)		**(A1) DC 1: Animal Diversity and Ecology (=50 marks)** Group B: Biology of Chordates (=10 marks) Unit 1: Introduction to Chordates- General characteristics and outline classification of phylum Chordata. Unit 2: Protochordata (invertebrate chordate) - General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to classes; retrogressive metamorphosis in Ascidia; chordate features and feeding in Branchiostoma **Practical (=15 marks) [(A1)-ZOOL-G-DC 1-P]:** • Biology of Chordates i. Identification: a. Protochordata: Balanoglossus, Herdmania, Branchiostoma;Agnatha-Petromyzon, Myxine.	18
	3RD SEMESTER (HONS.)		**ZOOL DC7: Developmental Biology and Reproductive Biology** Unit 1: Introduction- Basic concepts: Phases of development, cell-cell interaction, differentiation and growth, differential gene expression. Unit 2: Early Embryonic Development-Gametogenesis, spermatogenesis, oogenesis; types of eggs, egg membranes; fertilization in sea urchin, role of yolk in cleavage, blocks to polyspermy; planes and patterns of cleavage; fate maps (frog and chick); early development of frog and chick up to gastrulation; embryonic induction and organizers. Unit 3: Late Embryonic Development-Fate of germ layers; extra-embryonic membranes in chick, placenta (structure, types and functions of placenta)	45

			Practical (Full marks = 15) [ZOOL-H-DC7-P]: 1. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak 24, 48, 72, and 96 hours of incubation 2. Study of the developmental stages and life cycle of Drosophila from stock culture 3. Study of different sections of placenta (photomicropgraph/slides). 4. Project report on Drosophila culture/Chick embryo development/ Metamorphosis of Frog (Subject to UGC guideline	
	3RD SEMESTER (Gen)		**(A3)DC7 Physiology and Biochemistry** **Group A: Physiology (= 12.5 marks)** **Unit 1: Digestion and Absorption of Food-** Digestion and absorption of carbohydrates, fats and proteins. **Unit 2: Functioning of Excitable Tissue (Nerve and Muscle):** Structure of neuron, Propagation of nerve impulse (myelinated and non-myelinated nerve fibre); structure of skeletal muscle, Mechanism of muscle contraction, Neuromuscular junction, Synaptic transmission. Practical Group A: Experimentation Physiology i. Preparation of temporary mounts: Blood film. ii. Preparation of hemin and hemochromogen crystals iii. Estimation of haemoglobin using Sahli's haemoglobinometer.	18
	5th SEMESTER (Hons)		**ZOOL DC11: Histology and Endocrinology** Unit1: Muscular system-Histology of different types of muscle, Ultra structure of skeletal muscle. Unit:2: Histo-architechture of liver and its function. Unit 3: Introduction to Endocrinology-General idea of endocrine systems, classification, characteristic and transport of hormones, neurosecretions and neurohormones. Unit 4: Epiphysis, Hypothalamo-hypophysial Axis-(i) Structure of pineal gland, secretions and their functions in biological rhythms and reproduction, (ii) Structure and functions of hypothalamus and hypothalamic nuclei, regulation of neuro-endocrine glands, feedback mechanisms, (iii) Structure of pituitary gland, hormones and their functions, hypothalamo-hypophysial portal system, disorders of pituitary gland. **Practical (Full marks = 15)** 1. Study of animal house: set up and maintenance of basic animal house, breeding techniques, care taken for normal and experimental animals. 2. Examination of vaginal smear rats from live animals (Subject to UGC guideline). 3. Tissue fixation, embedding in paraffin, microtomy and slide preparation of any endocrine gland (Subject to UGC guideline).	45

			4. Examination of sections of mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid (Subject to UGC guideline). 5. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, Fallopian tube, Uterus (Subject to UGC guideline).	
2				
Oct22-Dec22	1ST SEMESTER (HONS.)		ZOOL DC2: Non-Chordates II (Coelomates) Unit 4: Onychophora: General characteristics and evolutionary significance. Unit 5: Mollusca: General characteristics and classification up to classes; Nervous system and torsion in Gastropoda; Feeding and respiration in Pila sp.	18
	1ST SEMESTER (Gen)		Discipline Core (DC): Zoology for General Studies (A1)DC 1: Animal Diversity and Ecology Theory[(A1)-ZOOL-G-DC 1-T]: Unit 7: Aschelminthes - General characteristics and classification up to classes, life cycle, and pathogenicity and control measures of Ascaris lumbricoides; Parasitic adaptation of Ascaris sp. Unit 8: Annelida - General characteristics and classification up to classes, Excretion in Annelida. Unit 9: Arthropoda - General characteristics and classification up to classes, Respiration in arthropoda (gills in prawn and trachea in cockroach). Unit 10: Onychophora- General characteristics, body structure and evolutionary significance. Unit 11: Mollusca: General characteristics and classification up to classes, Nervous system and torsion in gastropod; feeding and respiration in Pila sp. Page 5 of 23 Unit 12: Echinodermata: General characteristics and classification up to classes; water-vascular system in Asteroidea. Unit 13: Hemichordata: General characteristics of phylum Hemichordata; relationship with non-chordates and chordates.	18
	3RD SEMESTER (HONS.)		**ZOOL DC7: Developmental Biology and Reproductive Biology** Unit 5: Implications of Developmental Biology- (i) Teratogenesis: Teratogenic agents and their effects on embryonic development; in vitro fertilization, stem cell (ESC), amniocentesis Unit 6: Reproductive Endocrinology- (i) Mechanism of action of steroids and glycoprotein hormones. hypothalamo – hypophyseal – gonadal axis, regulation of gonadotrophin secretion in human (male and female),(ii) Reproductive system: development and differentiation of gonads, genital ducts and external genitalia. Unit 7: Reproductive Health- (i) Infertility in male and female: causes, diagnosis and	45

			management, (ii) Assisted reproductive technology: sex selection, sperm banks, frozen embryos, in vitro fertilization,(iii) Modern contraceptive technologies **Practical (Full marks = 15) [ZOOL-H-DC7-P]:** 5. Study of live gametes of white rat (Subject to UGC guideline). 6. Examination of vaginal smear from rats (Subject to UGC guideline). 7. Examination of histological sections from photomicrographs/permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, fallopian tube (Subject to UGC guideline).	
	3RD SEMESTER (Gen)		(A3)DC7 Physiology and Biochemistry Unit 3: Respiratory Physiology: Ventilation, external and internal respiration, transport of oxygen and carbon dioxide in blood. Unit 4: Renal Physiology: Functional anatomy of kidney, Mechanism of urine formation.	18
	5TH SEMESTER (Hons)		**ZOOL DC11: Histology and Endocrinology** Unit 4: Epiphysis, Hypothalamo-hypophysial Axis-(i) Structure of pineal gland, secretions and their functions in biological rhythms and reproduction, (ii) Structure and functions of hypothalamus and hypothalamic nuclei, regulation of neuro-endocrine glands, feedback mechanisms, (iii) Structure of pituitary gland, hormones and their functions, hypothalamo-hypophysial portal system, disorders of pituitary gland. Unit 5: Peripheral Endocrine Glands- (i) Structure, hormones, functions and regulation of thyroid gland, parathyroid, adrenal, pancreas, ovary and testis, (ii) Hormones in homeostasis, disorders of endocrine glands **Practical (=15 marks)** 4. Examination of sections of mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid (Subject to UGC guideline). 5. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, Fallopian tube, Uterus (Subject to UGC guideline). 6. Double staining of prepared histological slides (Subject to UGC guideline)	45
3				
Jan23-March23	2nd SEMESTER (HONS.)		DC3 **Unit 7: Reptilia: (**i) General characteristics and classification up to living Orders. (Young 1981),(ii) Poison apparatus and biting mechanism in snake, snake venom and method of treatment of snake biting,(ii) *Sphenodon*- present status **Unit 8: Aves: (i)** General characteristics and classification up to Sub-Classes. (Young, 1981),	18

			(ii) Exoskeleton and migration in birds, (ii) Principles and aerodynamics of flight, (iv) *Archaeopteryx*-a connecting link.	
	2nd SEMESTER (Gen)		**DC4** Unit 4: Circulatory System- General plan of circulation, comparative account of heart and aortic arches. Unit 5: Urinogenital System- Succession of kidney, Evolution of urinogenital ducts. DC4P i. **Study** of placoid, cycloid and ctenoid scales through permanent slides/photographs. ii. **Study** of disarticulated skeleton of toad, pigeon, fowl, guineapig and rabbit. iii. **Demonstration** of carapace and plastron of turtle.	18
	4th SEMESTER (HONS.)		**DC9** Unit 7: Physiology of Heart - Structure of mammalian heart, coronary circulation, structure and working of conducting myocardial fibres, origin and conduction of cardiac impulses; ECG, cardiac cycle and cardiac output; blood pressure and its regulation Unit 8: Thermoregulation & Osmoregulation - Physiological classification based on thermal biology; thermoregulation of homeotherms; osmoregulation in aquatic vertebrates; extra renal osmoregulatory organs in vertebrates. Unit 9: Renal Physiology - Histology of kidney and nephrons, mechanism of urine formation, glomerular filtration, tubular secretion, plasma clearance and counter current mechanism	45
	6TH SEMESTER (Hons)		**ZOOL DC13: Parasitology and Immunology, Group A: Parasitology (=12.5 marks)** Unit 1: Introduction to parasitology- Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship. Unit 2: Parasitic Protists: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani. **Group A : Laboratory Experimentation** 1. Study of life stages of Giardia intestinalis, Trypanosoma gambiense and Leishmania donovani through permanent slides/micro photographs. 2. Study of adult and life stages of Schistosoma haematobium and Taenia saginata through permanent slides/micro photographs. 3. Study of adult and life stages of Ancylostoma duodenale, Brugia malayi and Trichinella spiralis through permanent slides/micro photographs. 4. Study of Pediculus humanus, Xenopsylla cheopis and Cimex lectularius	45
4				
April23-June23	2nd SEMESTER (HONS.)		**DC3:** Unit 9: Mammals: (i) General characters and classification up to living Infra class (Young,1981), (ii) Affinities of Prototheria, (iii)	18

			Adaptive radiation in mammals with reference to locomotory appendages, (iv) Echolocation in Chiropterans and Cetaceans. **DC3P** iv. Amphibia: Necturus, Bufo, Rana, Hyla, Alytes, Axoltl, Tylototriton, Ambystoma. v. Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Crocodylus; Key for identification of poisonous and non-poisonous snakes. vi. Mammalia: Bat (insectivorous and frugivorous), Funambulus.	
	2nd SEMESTER (Gen)		DC4 **Unit 6: Nervous System-** Comparative account of brain, cranial nerves in mammals. **Unit 7: Skeletal System-** Evolution of visceral arches. **DC4P Grp-A** iv. Identification of mammalian skulls*: Bufo, Rana, Columba, Cavia* and Dog.	18
	4th SEMESTER (HONS.)		DC10 Grp-A Unit 1: Definition of taxonomy, micro- and macro taxonomy, systematic, Linnean hierarchy, cladistics, hierarchy, taxonomic types Unit 2: Principles of Binomial nomenclature. Unit 3: Species concept: Types and modes, type concept, primary and secondary types-definition and application.	45
	6TH SEMESTER (Hons)		**ZOOL DC13: Parasitology and Immunology,** **Group A: Parasitology (=12.5 marks)** Unit 3: Parasitic Platyhelminthes: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Schistosoma haematobium, Taenia saginata. Unit 4: Parasitic Nematodes: Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Ancylostoma duodenale, and Trichinella spiralis, Brugia malayi, Meloidogyne incognita, Heterodera rostochiensis-Life-Cycle, symptoms and control. **Practical (=15 marks)** Unit 5: Parasitic Arthropods: Biology, importance and control of Ticks, Mites, Lice, Flea and Bug Practical (=15 marks) 5. Study of nematode/cestode parasites from the intestines of Poultry bird (Intestine can be procured from poultry/market as a by-product). 6. Submission of a brief report on parasitic vertebrates. 7. Study of rectal parasites of Periplaneta sp. / Bufo sp. 8. Demonstration of lymphoid organs. 9. Histological study of spleen, thymus and lymph nodes through slides/ photographs	45

			10. Preparation of stained blood film to study various types of blood cells. 11. Antigen antibody reaction by immune-diffusion. 12. Demonstration of ELISA. 13. Determination of human blood group	

ACADEMIC QUARTER	CLASS	NAME OF THE TEACHER	TOPIC TO BE COVERED	NO OF LECTURES
JULY 22 TO SEPTEMBER 22	1ST SEMESTER (HONS.)	ATINDRIYA SEN HONS. (THEORY+ PRACTICAL) GENERAL (THEORY+ PRACTICAL) SYLLABUS TOPICS ARE TO BE ALLOTED	**ZOOL DC2: Non-Chordates II (Coelomates)** Unit 1: Unit 3: Arthropoda: General characteristics and classification up to classes; Respiration in Arthropoda (gills in prawn and trachea in cockroach), Metamorphosis in Lepidopteran insects, Vision in insects. Unit 4: Onychophora: General characteristics and evolutionary significance. Unit 5: Mollusca: General characteristics and classification up to classes; Nervous system and torsion in Gastropoda; Feeding and respiration in Pila sp. Unit 6: Echinodermata: General characteristics and classification up to classes; Water-vascular system in Asteroidea; Larval forms in Echinodermata; Affinities with Chordates. Unit 7: Hemichordata: General characteristics of phylum Hemichordata; Relationship with non-chordates and chordates. (Practical (Full marks = 15) [ZOOL-H-DC2-P] 1. Study of following specimens: a. Arthropods - Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, lepas, Sacculina, Carcinus, Eupagurus, Buthus, Scolopendra, Julus, Bombyx, Periplaneta, termites and honey bees,,Peripatus. b. Onychophora c. Molluscs - Chiton, Dentalium, Pila, Doris, Helix, Unio, Mytilus, Ostrea, Pinctada, Sepia, Octopus, Nautilus, Loligo. d. Echinodermates - Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon.	18

	1ST SEMESTER (Gen)		**Discipline Core Courses (DC): Zoology for General Studies** **(A1)DC 1: Animal Diversity and Ecology** **Theory[(A1)-ZOOL-G-DC 1-T]:** Group A: Biology of Non-Chordates(=10 marks) Unit 11: Mollusca: General characteristics and classification up to classes, Nervous system and torsion in gastropod; feeding and respiration in Pila. Unit 12: Echinodermata: General characteristics and classification up to classes; Discipline Core Courses (DC): Zoology for General Studies (A1)DC 1: Animal Diversity and Ecology Theory[(A1)-ZOOL-G-DC 1-T]: Group A: Biology of Non-Chordates(=10 marks) Unit 11: Mollusca: General characteristics and classification up to classes, Nervous system and torsion in gastropod; feeding and respiration in Pila. Unit 12: Echinodermata: General characteristics and classification up to classes; water-vascular system in Asteroidea. Unit 13: Hemichordata: General characteristics of phylum Hemichordata; relationship with non-chordates and chordates. Practical (=15 marks) [(A1)-ZOOL-G-DC 1-P]: •Identification: f. Molluscs : Chiton, Doris, Unio, Sepia, Octopus, Nautilus, Loligo. Mytilus. g. Echinodermate: Pentaceros/Asterias, Ophiura, Echinus, Cucumaria and Antedon. • Ecology: i. Study of an aquatic ecosystem: determination of pH, and Dissolved Oxygen content (Winkler's method) and CO2 in water. ii. Report on a one-day visit to Sanctuary/Zoo/Sericulture station/Fishery/apiculture station/pond ecosystem/agro-ecosystem.	18

	3RD SEMESTER (HONS.)		**ZOOL DC6: Ecology and Conservation Biology** **[Allotted Marks- 50 (Theory 25+ Practical 15+ Internal Assessment 10)]** Theory (Full marks = 25) [ZOOL-H-DC6-T] **Group A: Perspective of Ecology** (= 12.5 marks) Unit 1: Introduction to Ecology- History of ecology, autecology and synecology, levels of organization, laws of limiting factors, limiting factors: temperature and light. Unit 2: Population-(i) Population density, natality, birth rate and mortality,(ii) Unique and group attributes of population: demographic factors, life tables, fecundity tables, survivorship curves, dispersal and dispersion,(iii) Geometric, exponential and logistic growth, equation and patterns, r and k strategies, population regulation - density-dependent and independent factors, (iv) Population interactions, Gause's principle with laboratory and field examples, Lotka-Volterra equation for competition, intra- and inter-specific interaction. Unit 3: Community- (i) Community characteristics: Species diversity, abundance, dominance, richness, diversity indices, (ii) Vertical stratification, ecotone and edge effect, ecological succession with example. Unit 4: Structure of Ecosystem -(i) Types of ecosystem with examples in details, food chain: detritus and grazing food chains, linear and Y-shaped food chains, food web, energy flow through the ecosystem, ecological pyramids and ecological efficiencies. (ii) Nutrient and biogeochemical cycles with an example of nitrogen cycle. **Group B: Conservation Biology** Unit 1: Introduction to Biodiversity & Conservation- Types and level of biodiversity, Mega-biodiversity countries, Biodiversity Hotspots, Flagship species, Keystone species,	45

			Wild life conservation (In-situ and ex-situ conservation), Concept of protected areas, Red data book, IUCN categories, Indian Wildlife act-1972 and schedule. Importance and values of wild life causes of depletion of wild life and related conservation strategies of Tiger, Gibbon, Lion and Rhino. Unit 2: Man and Wildlife- Causes and consequences of human-wildlife conflicts; mitigation of conflict – an overview; management of excess population. **Practical (Full Marks = 15) [ZOOL-H-DC6-P]** Group A: Laboratory experimentation (= 10 marks) 1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided. 2. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community. 3. Study of an aquatic ecosystem: Estimation of population density of phytoplankton and zooplankton, measurement of area, temperature, turbidity/penetration of light, determination of pH, and dissolved oxygen content (Winkler's method), chemical oxygen demand, CO2 and alkalinity. 4. Report on a visit to National park/Biodiversity park/Wild life sanctuary/ Biodiversity study of any place of ecological interest.	

	3RD SEMESTER (Gen)		**(A3)DC7 Physiology and Biochemistry** Unit 4: Nucleic Acids - DNA is the genetic material, Structure of purines and pyrimidines, nucleosides, nucleotides, nucleic acids; types of DNA and RNA. Unit 5: Enzymes - Nomenclature and classification; Mechanism of enzyme action. **(A4) DC 10 Genetics and Evolutionary Biology (=50 marks)** (Theory: 25 marks, Practical: 15 marks, Internal Assessment: 10 marks) **Group B: Evolutionary Biology (= 12..5 marks)** Unit 1: Life's Beginnings- Origin of life, Chemogeny Unit 2: Theory and concept of evolution - Historical review of evolutionary concepts, Lamarkism, Darwinism and Neo-Darwinism, Geological time scale, evolution of Horse. Unit 3: Sources of variations - Types of variations and their role in evolution Unit 4: Population genetics - Hardy-Weinberg law, Natural selection; Genetic drift mechanism (Founder's effect, Bottleneck phenomenon); Unit 5: Species concept - Biological species concept (advantages and limitations), isolating mechanisms, modes of speciation (Allopatric, Sympatric) Unit 6: Macro-evolution – Idea about Macro-evolutionary Principles and stages in macro-evolution (example: Darwin's Finches) Unit 7: Zoogeography - Zoogeographical realms, distribution of birds and mammals in different realms. **Practical (=15 marks) [(A4)-ZOOL-G-DC 10-P]:** **Evolutionary Biology** i. Study of fossil evidences from plaster cast models and pictures ii. Study of homology and analogy from suitable specimens/ pictures iii. Study from charts: (i) Phylogeny of horse with diagrams/ cut outs of limbs and teeth of horse ancestors, (ii) Darwin's Finches with diagrams/ cut outs of beaks of different	18

			species. iv. Identification of Zoogeographical fauna.	
	5th SEMESTER (Hons)		**Paper ZOOL DC12: Economic Zoology and Industrial Zoology** [Allotted Marks- 50 (Theory: 25+ Practical: 15+ Internal Assessment: 10)] Theory (Full marks = 25) [ZOOL-H-DC12-T] Unit 1: Aquaculture: Composite fish culture, Induced breeding of fish, types of hatcheries, Prawn culture (Fresh Water), Pearl culture, Fish diseases Unit 2: Elementary idea on Agricultural insect pests : Categorization of insect pests; basic idea on economic threshold level (ETL) and economic injury level (EIL). Unit 3: Major insect pests: Life history, damage and control measures of the following pests a) Leptocorisa sp.,b) Scirpophaga sp c) Anomis sp. d) Autocharis sp. e) Sitophilus oryzae Unit 4: IPM and Insect Pest Management- Elementary idea about IPM, components, strategy and approaches, pest surveillance, sampling methods and forecasting. Elementary idea about GMO and its application on pest management. Unit 5: Insecticides: Types of insecticides, insecticide residues in food stuff, phyto-toxicity due to insecticide application, first aid antidotes. Evaluation of insecticide toxicity, insecticide synergism, potentiation and antagonism, insect pest resurgence, bio-rational insecticides. Unit 6: Animal Husbandry: Types of Cattle breeds, Artificial insemination. Unit 7: Poultry Farming: Types of poultry breeds, management of breeding stocks and broiler, poultry diseases and control. Unit 8: Preservation of fish: Causes of fish spoilage and prevention (Drying. Salting pickling and smoking, freezing) use of ice in storage,	45

			Harvest limit for sustainable fishery. **Practical (Full marks = 15) [ZOOL-H-DC12-P]** Group A : Laboratory Experimentation (= 10 marks) 1. Identification of different types of bees (Queens, Drones and Worker bees) with characters. 2. Identification of different types of silk moths with characters. 3. Identification of different types of pearls with characters. 4. Identification of different types of fish diseases with characters. 5. Identification of different types of scales in fishes with characters. 6. Identification of different types of fins with characters. 7. Study of different modified structures of fishes (Saw of sawfish, Hammer of hammer head fish, tail of sharks etc.). 8. Identification of various types of natural silks. 9. Visit to a sericulture farm/ poultry farm/ apiary.	
2				
Oct22-Dec22	1ST SEMESTER (HONS.)		**ZOOL DC2: Non-Chordates II (Coelomates)** Unit 1: Unit 3: Arthropoda: General characteristics and classification up to classes; Respiration in Arthropoda (gills in prawn and trachea in cockroach), Metamorphosis in Lepidopteran insects, Vision in insects. Unit 4: Onychophora: General characteristics and evolutionary significance. Unit 5: Mollusca: General characteristics and classification up to classes; Nervous system and torsion in Gastropoda; Feeding and respiration in Pila sp. Unit 6: Echinodermata: General characteristics and classification up to classes; Water-	18

			vascular system in Asteroidea; Larval forms in Echinodermata; Affinities with Chordates. Unit 7: Hemichordata: General characteristics of phylum Hemichordata; Relationship with non-chordates and chordates. **(Practical (Full marks = 15) [ZOOL-H-DC2-P]** 1. Study of following specimens: a. Arthropods - Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, lepas, Sacculina, Carcinus, Eupagurus, Buthus, Scolopendra, Julus, Bombyx, Periplaneta, termites and honey bees,,Peripatus. b. Onychophora c. Molluscs - Chiton, Dentalium, Pila, Doris, Helix, Unio, Mytilus, Ostrea, Pinctada, Sepia, Octopus, Nautilus, Loligo. d. Echinodermates - Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon.	
	1ST SEMESTER (Gen)		**Discipline Core Courses (DC): Zoology for General Studies** **(A1)DC 1: Animal Diversity and Ecology Theory[(A1)-ZOOL-G-DC 1-T]:** **Group A: Biology of Non-Chordates(=10 marks)** Unit 11: Mollusca: General characteristics and classification up to classes, Nervous system and torsion in gastropod; feeding and respiration in Pila. Unit 12: Echinodermata: General characteristics and classification up to classes; Discipline Core Courses (DC): Zoology for General Studies **(A1)DC 1: Animal Diversity and Ecology Theory[(A1)-ZOOL-G-DC 1-T]:** Group A: Biology of Non-Chordates(=10 marks) Unit 11: Mollusca: General characteristics and classification up to classes, Nervous system and torsion in gastropod; feeding and respiration in Pila. Unit 12: Echinodermata: General characteristics and classification up to classes;	18

			water-vascular system in Asteroidea. Unit 13: Hemichordata: General characteristics of phylum Hemichordata; relationship with non-chordates and chordates. Practical (=15 marks) [(A1)-ZOOL-G-DC 1-P]: •Identification: f. Molluscs : Chiton, Doris, Unio, Sepia, Octopus, Nautilus, Loligo. Mytilus. g. Echinodermate: Pentaceros/Asterias, Ophiura, Echinus, Cucumaria and Antedon. • Ecology: i. Study of an aquatic ecosystem: determination of pH, and Dissolved Oxygen content (Winkler's method) and CO2 in water. ii. Report on a one-day visit to Sanctuary/Zoo/Sericulture station/Fishery/apiculture station/pond ecosystem/agro-ecosystem	
	3RD SEMESTER (HONS.)		**ZOOL DC6: Ecology and Conservation Biology** [Allotted Marks- 50 (Theory 25+ Practical 15+ Internal Assessment 10)] Theory (Full marks = 25) [ZOOL-H-DC6-T] Group A: Perspective of Ecology (= 12.5 marks) Unit 1: Introduction to Ecology- History of ecology, autecology and synecology, levels of organization, laws of limiting factors, limiting factors: temperature and light. Unit 2: Population-(i) Population density, natality, birth rate and mortality,(ii) Unique and group attributes of population: demographic factors, life tables, fecundity tables, survivorship curves, dispersal and dispersion,(iii) Geometric, exponential and logistic growth, equation and patterns, r and k strategies, population regulation - density-dependent and independent factors, (iv) Population interactions, Gause's principle with laboratory and field examples, Lotka-Volterra equation for competition, intra- and inter-specific interaction. Unit 3: Community- (i) Community characteristics: Species diversity,	45

			abundance, dominance, richness, diversity indices, (ii) Vertical stratification, ecotone and edge effect, ecological succession with example. Unit 4: Structure of Ecosystem -(i) Types of ecosystem with examples in details, food chain: detritus and grazing food chains, linear and Y-shaped food chains, food web, energy flow through the ecosystem, ecological pyramids and ecological efficiencies. (ii) Nutrient and biogeochemical cycles with an example of nitrogen cycle. Group B: Conservation Biology Unit 1: Introduction to Biodiversity & Conservation-Types and level of biodiversity, Mega-biodiversity countries, Biodiversity Hotspots, Flagship species, Keystone species, Wild life conservation (In-situ and ex-situ conservation), Concept of protected areas, Red data book, IUCN categories, Indian Wildlife act-1972 and schedule. Importance and values of wild life causes of depletion of wild life and related conservation strategies of Tiger, Gibbon, Lion and Rhino. Unit 2: Man and Wildlife- Causes and ZOOL DC6: Ecology and Conservation Biology [Allotted Marks- 50 (Theory 25+ Practical 15+ Internal Assessment 10)] Theory (Full marks = 25) [ZOOL-H-DC6-T] Group A: Perspective of Ecology (= 12.5 marks) Unit 1: Introduction to Ecology- History of ecology, autecology and synecology, levels of organization, laws of limiting factors, limiting factors: temperature and light. Unit 2: Population-(i) Population density, natality, birth rate and mortality,(ii) Unique and group attributes of population: demographic factors, life tables, fecundity tables, survivorship curves, dispersal and dispersion,(iii) Geometric, exponential and logistic growth, equation and patterns, r and k strategies, population regulation - density-dependent and independent factors, (iv) Population interactions, Gause's principle with laboratory and field examples, Lotka-Volterra equation for competition, intra- and inter-specific interaction.	

			Unit 3: Community- (i) Community characteristics: Species diversity, abundance, dominance, richness, diversity indices, (ii) Vertical stratification, ecotone and edge effect, ecological succession with example. Unit 4: Structure of Ecosystem -(i) Types of ecosystem with examples in details, food chain: detritus and grazing food chains, linear and Y-shaped food chains, food web, energy flow through the ecosystem, ecological pyramids and ecological efficiencies. (ii) Nutrient and biogeochemical cycles with an example of nitrogen cycle. Group B: Conservation Biology Unit 1: Introduction to Biodiversity & Conservation- Types and level of biodiversity, Mega-biodiversity countries, Biodiversity Hotspots, Flagship species, Keystone species, Wild life conservation (In-situ and ex-situ conservation), Concept of protected areas, Red data book, IUCN categories, Indian Wildlife act-1972 and schedule. Importance and values of wild life causes of depletion of wild life and related conservation strategies of Tiger, Gibbon, Lion and Rhino. Unit 2: Man and Wildlife- Causes and consequences of human-wildlife conflicts; mitigation of conflict – an overview; management of excess population. Practical (Full Marks = 15) [ZOOL-H-DC6-P] Group A: Laboratory experimentation (= 10 marks) 1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided. 2. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community. 3. Study of an aquatic ecosystem: Estimation of population density of phytoplankton and zooplankton, measurement of area, temperature, turbidity/penetration of light, determination of pH, and dissolved oxygen content (Winkler's method), chemical oxygen demand, CO2 and alkalinity. 4. Report on a visit to National park/Biodiversity park/Wild life sanctuary/ Biodiversity study of any place of ecological interest.	
	3RD SEMESTER (Gen)		(A3)DC7 Physiology and Biochemistry Unit 4: Nucleic Acids - DNA is the genetic material, Structure of purines and	18

			pyrimidines, nucleosides, nucleotides, nucleic acids; types of DNA and RNA. Unit 5: Enzymes - Nomenclature and classification; Mechanism of enzyme action. **(A4) DC 10 Genetics and Evolutionary Biology (=50 marks)** (Theory: 25 marks, Practical: 15 marks, Internal Assessment: 10 marks) Group B: Evolutionary Biology (= 12..5 marks) Unit 1: Life's Beginnings- Origin of life, Chemogeny Unit 2: Theory and concept of evolution - Historical review of evolutionary concepts, Lamarkism, Darwinism and Neo-Darwinism, Geological time scale, evolution of Horse. Unit 3: Sources of variations - Types of variations and their role in evolution Unit 4: Population genetics - Hardy-Weinberg law, Natural selection; Genetic drift mechanism (Founder's effect, Bottleneck phenomenon); Unit 5: Species concept - Biological species concept (advantages and limitations), isolating mechanisms, modes of speciation (Allopatric, Sympatric) Unit 6: Macro-evolution – Idea about Macro-evolutionary Principles and stages in macro-evolution (example: Darwin's Finches) Unit 7: Zoogeography - Zoogeographical realms, distribution of birds and mammals in different realms. Practical (=15 marks) [(A4)-ZOOL-G-DC 10-P]: **Evolutionary Biology** i. Study of fossil evidences from plaster cast models and pictures ii. Study of homology and analogy from suitable specimens/ pictures iii. Study from charts: (i) Phylogeny of horse with diagrams/ cut outs of limbs and teeth of horse ancestors, (ii) Darwin's Finches with diagrams/ cut outs of beaks of different species.	

	5TH SEMESTER (Hons)		Paper ZOOL DC12: Economic Zoology and Industrial Zoology [Allotted Marks- 50 (Theory: 25+ Practical: 15+ Internal Assessment: 10)] Theory (Full marks = 25) [ZOOL-H-DC12-T] Unit 1: Aquaculture: Composite fish culture, Induced breeding of fish, types of hatcheries, Prawn culture (Fresh Water), Pearl culture, Fish diseases Unit 2: Elementary idea on Agricultural insect pests : Categorization of insect pests; basic idea on economic threshold level (ETL) and economic injury level (EIL). Unit 3: Major insect pests: Life history, damage and control measures of the following pests a) Leptocorisa sp.,b) Scirpophaga sp c) Anomis sp. d) Autocharis sp. e) Sitophilus oryzae Unit 4: IPM and Insect Pest Management- Elementary idea about IPM, components, strategy and approaches, pest surveillance, sampling methods and forecasting. Elementary idea about GMO and its application on pest management. Unit 5: Insecticides: Types of insecticides, insecticide residues in food stuff, phyto-toxicity due to insecticide application, first aid antidotes. Evaluation of insecticide toxicity, insecticide synergism, potentiation and antagonism, insect pest resurgence, bio-rational insecticides. Unit 6: Animal Husbandry: Types of Cattle breeds, Artificial insemination. Unit 7: Poultry Farming: Types of poultry breeds, management of breeding stocks and broiler, poultry diseases and control. Unit 8: Preservation of fish: Causes of fish spoilage and prevention (Drying. Salting pickling and smoking, freezing) use of ice in storage, Harvest limit for sustainable fishery. **Paper ZOOL DC12: Economic Zoology and Industrial Zoology**	45

			[Allotted Marks- 50 (Theory: 25+ Practical: 15+ Internal Assessment: 10)] **T**heory (Full marks = 25) [ZOOL-H-DC12-T] Unit 1: Aquaculture: Composite fish culture, Induced breeding of fish, types of hatcheries, Prawn culture (Fresh Water), Pearl culture, Fish diseases Unit 2: Elementary idea on Agricultural insect pests : Categorization of insect pests; basic idea on economic threshold level (ETL) and economic injury level (EIL). Unit 3: Major insect pests: Life history, damage and control measures of the following pests a) Leptocorisa sp.,b) Scirpophaga sp c) Anomis sp. d) Autocharis sp. e) Sitophilus oryzae Unit 4: IPM and Insect Pest Management- Elementary idea about IPM, components, strategy and approaches, pest surveillance, sampling methods and forecasting. Elementary idea about GMO and its application on pest management. Unit 5: Insecticides: Types of insecticides, insecticide residues in food stuff, phyto-toxicity due to insecticide application, first aid antidotes. Evaluation of insecticide toxicity, insecticide synergism, potentiation and antagonism, insect pest resurgence, bio-rational insecticides. Unit 6: Animal Husbandry: Types of Cattle breeds, Artificial insemination. Unit 7: Poultry Farming: Types of poultry breeds, management of breeding stocks and broiler, poultry diseases and control. Unit 8: Preservation of fish: Causes of fish spoilage and prevention (Drying. Salting pickling and smoking, freezing) use of ice in storage, Harvest limit for sustainable fishery. **Practical (Full marks = 15) [ZOOL-H-DC12-P]** **Group A : Laboratory Experimentation (= 10 marks)**	

			1. Identification of different types of bees (Queens, Drones and Worker bees) with characters. 2. Identification of different types of silk moths with characters. 3. Identification of different types of pearls with characters. 4. Identification of different types of fish diseases with characters. 5. Identification of different types of scales in fishes with characters. 6. Identification of different types of fins with characters. 7. Study of different modified structures of fishes (Saw of sawfish, Hammer of hammer head fish, tail of sharks etc.). 8. Identification of various types of natural silks. 9. Visit to a sericulture farm/ poultry farm/ apiary.	
3				
Jan23-March23	2nd SEMESTER (HONS.)		**ZOOL DC4: Comparative Anatomy of Vertebrates** **[Allotted Marks- 50 (Theory: 25+ Practical: 15+ Internal Assessment: 10)]** Unit 5: Circulatory System: General plan of circulation; Comparative account of heart and aortic arches. Unit 6: Urinogenital System: Comparative anatomy of kidney; Evolution of urinogenital ducts; Types of mammalian uteri. Unit 7: Nervous System: Comparative account of brain; Cranial nerves in mammals **(Origin distribution and nature)**	18
	2nd SEMESTER (Gen)		**(A2)-DC 4 Comparative Anatomy and Developmental Biology of** **Vertebrates (=50 marks)**	18

			(Theory: 25 marks, Practical: 15 marks, Internal Assessment: 10 marks) **Theory (=25 marks) [(A2)-ZOOL-G-DC 4-T]:** **Group A: Comparative Anatomy (= 12.5 marks)** Unit 4: Circulatory System- General plan of circulation, comparative account of heart and aortic arches. Unit 5: Urinogenital System- Succession of kidney, Evolution of urinogenital ducts. Unit 6: Nervous System- Comparative account of brain, cranial nerves in mammals. Unit 7: Skeletal System- Evolution of visceral arches.	
	4th SEMESTER (HONS.)		**ZOOL DC10: Systematics and Evolution (Full marks = 50)** **[Allotted Marks- 50 (Theory: 25+ Practical: 15+ Internal Assessment: 10)]** Group B: Evolution (=12.5marks) Unit 1: Evidences of organic evolution- Study of comparative anatomy, embryology, paleontology, biochemistry, physiology and molecular biology. Unit 2 : Origin of life, chemogeny, RNA world Unit 3: Historical review of evolutionary concepts, Lamarkism, Darwinism and natural selection and Neo-Darwinism Unit 4: Geological time scale, Evolution of horse. Unit 5: Sources of variations and their role in evolution. Unit 6 : Population genetics- Hardy-Weinberg law (statement and derivation of equation, application of law to human population); genetic drift mechanism (founder's effect, bottleneck phenomenon). Unit 7: Species- Species concept, isolating mechanisms, modes of speciation; adaptive radiation/macroevolution (exemplified by mammals and Galapagos finches).	45

			Unit 8: Abolition of species- Extinctions, Back ground and mass extinctions (causes and effects), detailed example of K-T extinction. Unit 9: Animal distribution- Pattern of animal distribution, factors affecting animal distribution, zoogeographical realms and their faunal peculiarities; Plate tectonic and continental drift theory. Practical (Full marks = 15) [ZOOL-H-DC10-P] Group A: Laboratory experimentation (=10 marks) 1. Cladistic analysis on the supplied data. 2. Morphometric analysis of the wing, antenna, leg of insect for taxonomic categorization. 3. Analysis of RFLP and RAPD data in connection with molecular taxonomy on supplied data. 4. Allozyme analysis in relation to morphology and taxonomy 5. Dichotomous key preparation for insect identification at genus level 6. Mapping of the distribution of endangered species on supplied data. 7. Study of homology and analogy from suitable specimens 8. Study of fossils from models / pictures. 9. Study and verification of Hardy-Weinberg Law by chi-square analysis. 10. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex. 11. Distribution of animals in Zoogeographical realm by map pointing method. 12. Pedigree analysis of some human inherited traits.	
	6^{TH} SEMESTER (Hons)		**ZOOL DC14: Molecular Biology** **[Allotted Marks- 50 (Theory: 25+ Practical: 15+ Internal Assessment: 10)]** **Theory (Full marks = 25) [ZOOL-H-DC14-T]**	45

			Unit 6: Gene Mutation-Molecular basis of gene mutation in relation to spontaneous mutation and physical and chemical mutagens. Unit 7: DNA Repair Mechanisms-Photo-reactivation nucleotide and base excision repair, SOS response. Unit 8: Cancer Biology- Concepts of proto oncogenes and oncogenes, Activation of proto oncogenes to oncogenes , Properties of cancer cells, Study of Retrovirus and oncogene (Ras) mediated cancer. Tumor suppressor genes with special reference to p53 and retinoblastoma. Apoptosis and necrosis. Unit 9: Molecular Techniques-PCR, Western and Southern blot, Northern Blot, DNA sequencing, DNA finger printing.	
4				
April23-June23	2nd SEMESTER (HONS.)		**ZOOL DC4: Comparative Anatomy of Vertebrates** [Allotted Marks- 50 (Theory: 25+ Practical: 15+ Internal Assessment: 10)] Unit 5: Circulatory System: General plan of circulation; Comparative account of heart and aortic arches. Unit 6: Urinogenital System: Comparative anatomy of kidney; Evolution of urinogenital ducts; Types of mammalian uteri. Unit 7: Nervous System: Comparative account of brain; Cranial nerves in mammals	18
	2nd SEMESTER (Gen)		DC4 (A2)-DC 4 Comparative Anatomy and Developmental Biology of Vertebrates (=50 marks) (Theory: 25 marks, Practical: 15 marks, Internal Assessment: 10 marks) Theory (=25 marks) [(A2)-ZOOL-G-DC 4-T]:	18

			Group A: Comparative Anatomy (= 12.5 marks) Unit 4: Circulatory System- General plan of circulation, comparative account of heart and aortic arches. Unit 5: Urinogenital System- Succession of kidney, Evolution of urinogenital ducts. Unit 6: Nervous System- Comparative account of brain, cranial nerves in mammals. Unit 7: Skeletal System- Evolution of visceral arches.	
	4th SEMESTER (HONS.)		ZOOL DC10: Systematics and Evolution (Full marks = 50) [Allotted Marks- 50 (Theory: 25+ Practical: 15+ Internal Assessment: 10)] Group B: Evolution (=12.5marks) Unit 1: Evidences of organic evolution- Study of comparative anatomy, embryology, paleontology, biochemistry, physiology and molecular biology. Unit 2 : Origin of life, chemogeny, RNA world Unit 3: Historical review of evolutionary concepts, Lamarkism, Darwinism and natural selection and Neo-Darwinism Unit 4: Geological time scale, Evolution of horse. Unit 5: Sources of variations and their role in evolution. Unit 6 : Population genetics- Hardy-Weinberg law (statement and derivation of equation, application of law to human population); genetic drift mechanism (founder's effect, bottleneck phenomenon). Unit 7: Species- Species concept, isolating mechanisms, modes of speciation; adaptive radiation/macroevolution (exemplified by mammals and Galapagos finches). Unit 8: Abolition of species- Extinctions, Back ground and mass extinctions (causes and effects), detailed example of K-T extinction.	45

			Unit 9: Animal distribution- Pattern of animal distribution, factors affecting animal distribution, zoogeographical realms and their faunal peculiarities; Plate tectonic and continental drift theory. Practical (Full marks = 15) [ZOOL-H-DC10-P] Group A: Laboratory experimentation (=10 marks) 1. Cladistic analysis on the supplied data. 2. Morphometric analysis of the wing, antenna, leg of insect for taxonomic categorization. 3. Analysis of RFLP and RAPD data in connection with molecular taxonomy on supplied data. 4. Allozyme analysis in relation to morphology and taxonomy 5. Dichotomous key preparation for insect identification at genus level 6. Mapping of the distribution of endangered species on supplied data. 7. Study of homology and analogy from suitable specimens 8. Study of fossils from models / pictures. 9. Study and verification of Hardy-Weinberg Law by chi-square analysis. 10. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex. 11. Distribution of animals in Zoogeographical realm by map pointing method. 12. Pedigree analysis of some human inherited traits.	
	6TH SEMESTER (Hons)		**ZOOL DC14: Molecular Biology** [Allotted Marks- 50 (Theory: 25+ Practical: 15+ Internal Assessment: 10)] Theory (Full marks = 25) [ZOOL-H-DC14-T] Unit 6: Gene Mutation-Molecular basis of gene mutation in relation to spontaneous mutation and physical and chemical mutagens. Unit 7: DNA Repair Mechanisms-Photo-reactivation nucleotide and base excision	45

			repair, SOS response. Unit 8: Cancer Biology- Concepts of proto oncogenes and oncogenes, Activation of proto oncogenes to oncogenes , Properties of cancer cells, Study of Retrovirus and oncogene (Ras) mediated cancer. Tumor suppressor genes with special reference to p53 and retinoblastoma. Apoptosis and necrosis. Unit 9: Molecular Techniques-PCR, Western and Southern blot, Northern Blot, DNA sequencing, DNA finger printing.	