**ACADEMIC CALENDER (ODD SEMESTER)**

**Semester I**

**(Zoology Hons; CBCS)**

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| Semester I (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **CC-1: Non-Chordates I** (Theory) | Full Marks:55 Credit:4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | **Unit 1: Basics of Animal Classification**

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| Definitions: Classification, Systematics and Taxonomy; Taxonomic Hierarchy, Taxonomic types  |
| Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy; Six kingdom  |
| concept of classification (Card woese)  |

 | 4 | DEBARSHI MONDAL |  |
| 2 | **Unit 2: Protista and Metazoa**

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| Protozoa  |
| General characteristics and Classification up to phylum (according to Levine et. al., 1981) Locomotion  |
| in *Euglena*, *Paramoecium* and *Amoeba*; Conjugation in *Paramoecium*.  |
| Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica*  |
| **Metazoa**  |
| Evolution of symmetry and segmentation of Metazoa  |

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| 3 | **Unit 3: Porifera** General characteristics and Classification up to classes; Canal system and spicules in sponges  | 6 | DEBARSHI MONDAL |  |
| 4 | **Unit 4: Cnidaria**

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| General characteristics and Classification up to classes Metagenesis in *Obelia*& *Aurelia*  |
| Metagenesis in *Obelia*  |
| Polymorphism in Cnidaria  |
| Corals and coral reef diversity, function & conservation  |

 | 10 | Dr. SUDIPTA CHAKRABORTY |  |
| 5 | **Unit 5: Ctenophora** General characteristics  | 2 | Dr. SUDIPTA CHAKRABORTY |  |
| 6 | **Unit 6: Platyhelminthes**

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| General characteristics and Classification up to classes  |
| Life cycle and pathogenicity and control measures of *Fasciola hepatica* and *Taenia solium*  |

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| 7 | **Unit 7: Nematoda**

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| General characteristics and Classification up to classes  |
| Life cycle, and pathogenicity and control measures of *Ascaris lumbricoides* and *Wuchereria bancrofti*  |
| Parasitic adaptations in helminthes  |

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| Semester I (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **C1 P1 –Non-Chordates I** (Practical) | Full Marks: 20 Credit:2 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | 1. Study of whole mount of *Euglena*, *Amoeba* and *Paramoecium*  | 3 | DEBARSHI MONDAL |  |
| 2 | 2. Identification of *Amoeba*, *Euglena*, *Entamoeba*, *Opalina, Paramecium*, *Plasmodium vivax* and *Plasmodium falciparum* (from the prepared slides)  | 4 | DEBARSHI MONDAL |  |
| 3 | 3. Identification of *Sycon*, Neptune’s Cup, *Obelia*, *Physalia*, *Millepora*, *Aurelia*, *Tubipora*, *Corallium*, *Alcyonium*, *Gorgonia*, *Metridium*, *Pennatula*, *Fungia*, *Meandrina*, *Madrepora*  | 3 | DEBARSHI MONDAL |  |
| 4 | 4. Identification and significance of adult *Fasciola hepatica*, *Taenia solium* and *Ascaris lumbricoides*  | 3 | Dr. MANIDIP SHASMAL |  |
| 5 | 5. Staining/mounting of any protozoa/helminth from gut of cockroach  | 3 | Dr. SUDIPTA CHAKRABORTY |  |

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| Semester I (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: C2 T–Ecology (Theory) | Full Marks:55 Credit:4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
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| **Unit 1: Introduction to Ecology**  |  |
| History of ecology, Autecology and synecology, Levels of organization, Laws of limiting  |
| factors,Study of Physical factors, The Biosphere  |

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| **Unit 2: Population**  |  |
| Unitary and Modular populations  |
| Unique and group attributes of population: Demographic factors, life tables, fecundity tables,  |
| survivorship curves, dispersal and dispersion.  |
| Geometric, exponential and logistic growth, equation and patterns, r and K strategies Population  |
| regulation - density-dependent and independent factors  |
| Population Interactions, Gause’s Principle with laboratory and field examples, Lotka-Volterra equation  |
| for competition.  |

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| **Unit 3: Community**  |  |
| Community characteristics: species diversity, abundance, , dominance, richness,  |
| Vertical stratification, Ecotone and edge effect. Ecological succession with one example  |

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| **Unit 4: Ecosystem**  |  |
| Types of ecosystem with an example in detail, Food chain: Detritus and grazing food chains,

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| Linear  |
| and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and  |
| Ecological efficiencies  |
| Nutrient and biogeochemical cycle with an example of Nitrogen cycle  |
| Human modified ecosystem  |

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| **Unit 5: Applied Ecology**  |  |
| Wildlife Conservation (in-situ and ex-situ conservation).  |
| Management strategies for tiger conservation; Wild life protection act (1972)  |

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| Semester I (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **C2 P –Ecology Lab** (Practical) | Full Marks: 20 Credit: 2 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | 1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided  | 4 | DEBARSHI MONDAL |  |
| 2 | 2. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community  | 5 | Dr. MANIDIP SHASMAL |  |
| 3 | 3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler’s method), Chemical Oxygen Demand and free CO2 | 6 | Dr. SUDIPTA CHAKRABORTY |  |
| 4 | 4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary  | 1 | Dr. SUDIPTA CHAKRABORTY |  |

**ACADEMIC CALENDER (ODD SEMESTER)**

**Semester III**

**(Zoology Honours; CBCS)**

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| Semester III (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **CC-5: Chordates** (Theory) | Full Marks:55 Credit:4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | **Unit 1: Introduction to Chordates** General characteristics and outline classification of Phylum Chordata  | 5 | DEBARSHI MONDAL |  |
| 2 | **Unit 2: Protochordata** General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Retrogressive metamorphosis in *Ascidia*. Chordate Features and Feeding in *Branchiostoma*  | 5 | DEBARSHI MONDAL |  |
| 3 | **Unit 3: Origin of Chordata** Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata | 5 | DEBARSHI MONDAL |  |
| 4 | **Unit 4: Agnatha** General characteristics and classification of cyclostomes up to order | 4 | DEBARSHI MONDAL |  |
| 5 | **Unit 5: Pisces** General characteristics and classification of Chondrichthyes and Osteichthyes up to Subclasses Accessory respiratory organ, migration and parental care in fishes Swim bladder in fishes. Classification up to Sub-Classes  | 6 | DEBARSHI MONDAL |  |
| 6 | **Unit 6: Amphibia** General characteristics and classification up to living Orders. Metamorphosis and parental care in Amphibia  | 5 | DEBARSHI MONDAL |  |
| 7 | **Unit 7: Reptilia** General characteristics and classification up to living Orders. Poison apparatus and Biting mechanism in Snake  | 5 | Dr. MANIDIP SHASMAL |  |
| 8 | **Unit 8: Aves** General characteristics and classification up to Sub-Classes Exoskeleton and migration in Birds Principles and aerodynamics of flight  | 5 | Dr. MANIDIP SHASMAL |  |
| 9 | **Unit 9: Mammals** General characters and classification up to living orders Affinities of Prototheria Exoskeleton derivatives of mammals Adaptive radiation in mammals with reference to locomotory appendages Echolocation in Micro chiropterans and Cetaceans  | 6 | Dr. SUDIPTA CHAKRABORTY |  |
| 10 | **Unit 10: Zoogeography** Zoogeographical realms, Plate tectonic and Continental drift theory, distribution of birds and mammals in different realms  | 4 | Dr. SUDIPTA CHAKRABORTY |  |

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| Semester III (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **C5P: Chordates Lab** (Practical) | Full Marks: 20 Credit: 2 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | 1. Protochordata *Balanoglossus*, *Herdmania*, *Branchiostoma*  | 2 | DEBARSHI MONDAL |  |
| 2 | 2. Agnatha *Petromyzon*, *Myxine*   | 2 | DEBARSHI MONDAL |  |
| 3 | 3. Fishes *Scoliodon*, *Sphyrna*, *Pristis*, *Torpedo*, *Chimaera*, *Mystus*, *Heteropneustes*, *Labeo*, *Exocoetus*, *Echeneis*, *Anguilla*, *Hippocampus*, *Tetrodon*/ *Diodon*, *Anabas*, Flat fish  | 2 | DEBARSHI MONDAL |  |
| 4 | 4. Amphibia *Necturus, Bufo, Hyla, Alytes, Axolotl, Tylototriton*  | 2 | Dr. MANIDIP SHASMAL |  |
| 5 | 5. Reptilia *Chelone*, *Trionyx*, *Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus*. Key for Identification of poisonous and non-poisonous snakes | 2 | Dr. MANIDIP SHASMAL |  |
| 6 | 6. Mammalia: Bat (Insectivorous and Frugivorous), *Funambulus*  | 2 | Dr. SUDIPTA CHAKRABORTY |  |
| 7 | 7. Pecten from Fowl head  | 2 | Dr. SUDIPTA CHAKRABORTY |  |
| 8 | 8. Dissection of brain and pituitary of Tilapia  | 1 | Dr. SUDIPTA CHAKRABORTY |  |
| 9 | 9. Power point presentation on study of any two animals from two different classes by students (may be included if dissections not given permission)  | 1 | Dr. SUDIPTA CHAKRABORTY |  |

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| Semester III (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **CC-6: Animal Physiology: Controlling & Coordinating Systems** (Theory) | Full Marks: 55 Credit: 4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | **Unit 1: Tissues** Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue and, fixation and staining of tissues.  | 8 | Dr. MANIDIP SHASMAL |  |
| 2 | **Unit 2: Bone and Cartilage** Structure and types of bones and cartilages, Ossification  | 8 | Dr. SUDIPTA CHAKRABORTY |  |
| 3 | **Unit 3: Nervous System** Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and Neuromuscular junction; Reflex action and its types  | 8 | Dr. MANIDIP SHASMAL |  |
| 4 | **Unit 4: Muscular system** Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle fibre  | 8 | Dr. SUDIPTA CHAKRABORTY |  |
| 5 | **Unit 5: Reproductive System** Histology of testis and ovary Physiology of Reproduction  | 8 | DEBARSHI MONDAL |  |
| 6 | **Unit 6: Endocrine System** Histology and function of pituitary, thyroid, pancreas and adrenal Classification of hormones; Mechanism of Hormone action Signal transduction pathways for Steroidal and Non steroidal hormones Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system Placental hormones  | 10 | DEBARSHI MONDAL |  |

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| Semester III (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **C6P: Animal Physiology: Controlling & Coordinating Systems Lab** (Practical) | Full Marks: 20 Credit: 2 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | 1. Recording of simple muscle twitch with electrical stimulation (or Virtual)   | 3 | Dr. SUDIPTA CHAKRABORTY |  |
| 2 | 2. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex)   | 3 | Dr. SUDIPTA CHAKRABORTY |  |
| 3 | 3. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells   | 3 | Dr. MANIDIP SHASMAL |  |
| 4 | 4. Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid   | 3 | DEBARSHI MONDAL |  |
| 5 | 5. Microtomy: Preparation of permanent slide of any five mammalian (Goat/white rat) tissues   | 4 | DEBARSHI MONDAL |  |

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| Semester III (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **CC-7: Fundamentals of Biochemistry** (Theory) | Full Marks: 55 Credit: 4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | **Unit 1: Carbohydrates** Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of MonosachharidesCarbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis | 8 | Dr. MANIDIP SHASMAL |  |
| 2 | **Unit 2: Lipids** Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpinoids. Lipid metabolism: β-oxidation of fatty acids; Fatty acid biosynthesis | 8 | Dr. MANIDIP SHASMAL |  |
| 3 | **Unit 3: Proteins** Amino acids Structure, Classification, General and Electro chemical properties of α-amino acids; Physiological importance of essential and non-essential amino acids Proteins Bonds stabilizing protein structure; Levels of organization Protein metabolism: Transamination, Deamination, Urea cycle, Fate of C-skeleton of Glucogenic and Ketogenic amino acids | 8 | Dr. MANIDIP SHASMAL |  |
| 4 | **Unit 4: Nucleic Acids** Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids Types of DNA and RNA, Complementarity of DNA, Hpyo- Hyperchromaticity of DNA Basic concept of nucleotide metabolism | 10 | Dr. SUDIPTA CHAKRABORTY |  |
| 5 | **Unit 5: Enzymes** Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Derivation of Michaelis-Menten equation, Lineweaver-Burk plot; Factors affecting rate of enzyme-catalyzed reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Strategy of enzyme action- Catalytic and Regulatory (Basic concept with one example each) | 10 | DEBARSHI MONDAL |  |
| 6 | **Unit 6: Oxidative Phosphorylation** Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System | 6 | Dr. SUDIPTA CHAKRABORTY |  |

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| Semester III (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **C7P: Fundamentals of Biochemistry Lab** (Practical) | Full Marks: 20 Credit: 2 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | 1. Qualitative tests of functional groups in carbohydrates, proteins and lipid   | 3 | DEBARSHI MONDAL |  |
| 2 | 2. Paper chromatography of amino acids.   | 3 | DEBARSHI MONDAL |  |
| 3 | 3. Quantitative estimation of Lowry Methods   | 3 | Dr. MANIDIP SHASMAL |  |
| 4 | 4. Demonstration of proteins separation by SDS-PAGE.   | 2 | Dr. MANIDIP SHASMAL |  |
| 5 | 5. To study the enzymatic activity of Trypsin and Lipase.   | 2 | Dr. MANIDIP SHASMAL |  |
| 6 | 6. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.  | 3 | Dr. SUDIPTA CHAKRABORTY |  |

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| Semester III (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **SEC1: Apiculture** (Theory) | Full Marks: 55 Credit: 4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | **Unit 1: Biology of Bees** History, Classification and Biology of Honey Bees Social Organization of Bee Colony | 10 | Dr. SUDIPTA CHAKRABORTY |  |
| 2 | **Unit 2: Rearing of Bees** Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth Bee Pasturage Selection of Bee Species for Apiculture Bee Keeping Equipment Methods of Extraction of Honey (Indigenous and Modern)  | 10 | Dr. SUDIPTA CHAKRABORTY |  |
| 3 | **Unit 3: Diseases and Enemies** Bee Diseases and Enemies Control and Preventive measures | 10 | DEBARSHI MONDAL |  |
| 4 | **Unit 4: Bee Economy** Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc  | 10 | DEBARSHI MONDAL |  |
| 5 | **Unit 5: Entrepreneurship in Apiculture** Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial. Beehives for cross pollination in horticultural gardens  | 10 | Dr. MANIDIP SHASMAL |  |

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| Semester III (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **GE-3: Aquatic Biology** (Theory) | Full Marks: 55 Credit: 4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | **UNIT 1: Aquatic Biomes** Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs. | 12 | DEBARSHI MONDAL |  |
| 2 | **UNIT 2: Freshwater Biology** **Lakes**: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico–chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; Dissolved gases (oxygen, carbon dioxide). Nutrient Cycles in Lakes-Nitrogen, Sulphur and Phosphorous. **Streams:** Different stages of stream development, Physico-chemical environment, Adaptation of hill-stream fishes. | 13 | DEBARSHI MONDAL |  |
| 3 | **UNIT 3: Marine Biology**Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds. | 12 | Dr. SUDIPTA CHAKRABORTY |  |
| 4 | **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. | 13 | Dr. MANIDIP SHASMAL |  |

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| Semester III (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **GE3 P: Aquatic Biology Lab** (Practical) | Full Marks: 20 Credit: 2 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | 1. Determine the area of a lake using graphimetric and gravimetric method.  | 3 | DEBARSHI MONDAL |  |
| 2 | 2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.  | 4 | DEBARSHI MONDAL |  |
| 3 | 3. Determine the amount of Turbidity/transparency, Dissolved oxygen, carbon dioxide, alkalinity (carbonates & bicarbonates) in water collected from a nearby lake/ water body.  | 5 | Dr. MANIDIP SHASMAL |  |
| 4 | 4. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.  | 3 | Dr. SUDIPTA CHAKRABORTY |  |
| 5 | 5. A Project Report on a visit to a Sewage treatment plant/Marine bioreserve/ Fisheries Institutes  | 1 | Dr. SUDIPTA CHAKRABORTY |  |

**ACADEMIC CALENDER (ODD SEMESTER)**

**Semester V**

**(Zoology Honours; CBCS)**

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| Semester V (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **CC-11: Molecular Biology** (Theory) | Full Marks: 55 Credit: 4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | **Unit 1: Nucleic Acids** Salient features of DNA and RNA. Watson and Crick Model of DNA  | 5 | Dr. SUDIPTA CHAKRABORTY |  |
| 2 | **Unit 2: DNA Replication** Mechanism of DNA Replication in Prokaryotes, Semi-conservative, bidirectional and discontinuous Replication, RNA priming, Replication of telomeres  | 8 | DEBARSHI MONDAL |  |
| 3 | **Unit 3: Transcription** Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription  | 8 | Dr. SUDIPTA CHAKRABORTY |  |
| 4 | **Unit 4: Translation** Mechanism of protein synthesis in prokaryotes, Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation  | 8 | Dr. MANIDIP SHASMAL |  |
| 5 | **Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA** Capping and Poly A tail formation in mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA  | 5 | Dr. MANIDIP SHASMAL |  |
| 6 | **Unit 6: Gene Regulation** Regulation of Transcription in prokaryotes: *lac* operon and *trp* operon; Regulation of Transcription in eukaryotes: Activators, enhancers, silencer, repressors, miRNA mediated gene silencing, Genetic imprinting  | 5 | DEBARSHI MONDAL |  |
| 7 | **Unit 7: DNA Repair Mechanisms** Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair  | 5 | Dr. MANIDIP SHASMAL |  |
| 8 | **Unit 8: Molecular Techniques** PCR, Western and Southern blot, Northern Blot, Sanger DNA sequencing  | 6 | Dr. MANIDIP SHASMAL |  |

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| Semester V (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **C11P: Molecular Biology** (Practical) | Full Marks: 20 Credit:2 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | 1. Demonstration of polytene and lampbrush chromosome from photograph   | 5 | DEBARSHI MONDAL |  |
| 2 | 2. Isolation and quantification of genomic DNA using spectrophotometer (A260 measurement)   | 5 | Dr. SUDIPTA CHAKRABORTY |  |
| 3 | 3. Agarose gel electrophoresis for DNA   | 6 | Dr. MANIDIP SHASMAL |  |

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| Semester V (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **CC-12: Genetics** (Theory) | Full Marks: 55 Credit: 4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | **Unit 1: Mendelian Genetics and its Extension** Principles of inheritance, Incomplete dominance and co-dominance, Epistasis Multiple alleles, Lethal alleles, Pleiotropy, Sex-linked, sex- influenced and sex-limited inheritance, Polygenic Inheritance | 8 | DEBARSHI MONDAL |  |
| 2 | **Unit 2: Linkage, Crossing Over and Chromosomal Mapping** Linkage and Crossing Over, molecular basis of crossing over, Measuring Recombination frequency and linkage intensity using three factor crosses, Interference and coincidence | 8 | DEBARSHI MONDAL |  |
| 3 | **Unit 3: Mutations** Types of gene mutations (Classification), Types of chromosomal aberrations (Classification with one suitable example of each), Non-disjunction and variation in chromosome number; Molecular basis of mutations in relation to UV light and chemical mutagens | 8 | Dr. SUDIPTA CHAKRABORTY |  |
| 4 | **Unit 4: Sex Determination** Mechanisms of sex determination in *Drosophila* Sex determination in mammals Dosage compensation in *Drosophila* & Human | 8 | Dr. SUDIPTA CHAKRABORTY |  |
| 5 | **Unit 5: Extra-chromosomal Inheritance** Criteria for extra chromosomal inheritance, Antibiotic resistance in *Chlamyadomonas,* Kappa particle in *Paramoecium* Shell spiralling in snail | 5 | Dr. MANIDIP SHASMAL |  |
| 6 | **Unit 6: Recombination in Bacteria and Viruses** Conjugation, Transformation, Transduction, Complementation test in Bacteriophage | 7 | Dr. MANIDIP SHASMAL |  |
| 7 | **Unit 7: Transposable Genetic Elements** Transposons in bacteria, Ac-Ds elements in maize and P elements in *Drosophila,* LINE, SINE, Alu elements in humans  | 6 | DEBARSHI MONDAL |  |

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| Semester V (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **C12P: Genetics** (Practical) | Full Marks: 20 Credit: 2 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | 1. Chi-square analyses   | 5 | Dr. SUDIPTA CHAKRABORTY |  |
| 2 | 2. Linkage maps based on conjugation   | 3 | Dr. MANIDIP SHASMAL |  |
| 3 | 3. Identification of chromosomal aberration in Drosophila and man from photograph   | 3 | DEBARSHI MONDAL |  |
| 4 | 4. Pedigree analysis of some human inherited traits  | 5 | DEBARSHI MONDAL |  |

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| Semester V (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **DSE-1: Reproductive Biology** (Theory) | Full Marks: 55 Credit: 4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | **Unit 1: Reproductive Endocrinology** Mechanism of action of steroids and glycoprotein hormones. hypothalamo – hypophyseal – gonadal axis, regulation of gonadotrophin secretion in human (male and female) Reproductive system: Development and differentiation of gonads, genital ducts and external genitalia | 12 | DEBARSHI MONDAL |  |
| 2 | **Unit 2: Functional anatomy of male reproduction** Histoarchitechture of testis in human; Spermatogenesis; Kinetics and hormonal regulation; Androgen synthesis and metabolism; Accessory glands functions | 12 | Dr. MANIDIP SHASMAL |  |
| 3 | **Unit 3: Functional anatomy of female reproduction** Histoarchitechture of ovary in human; Oogenesis; Kinetics and hormonal regulation; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (human) and their regulation, fertilization; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto – maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its Regulation | 14 | Dr. SUDIPTA CHAKRABORTY |  |
| 4 | **Unit 4: Reproductive Health** Infertility in male and female: causes, diagnosis and management Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization Modern contraceptive technologies | 12 | Dr. SUDIPTA CHAKRABORTY |  |

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| Semester V (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **DSE1P: Reproductive Biology** (Practical) | Full Marks: 20 Credit: 2 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | 1. Study of animal house: set up and maintenance of animal house, breeding techniques, care of normal and experimental animals.   | 4 | Dr. SUDIPTA CHAKRABORTY |  |
| 2 | 2. Examination of vaginal smear rats from live animals.  | 2 | Dr. MANIDIP SHASMAL |  |
| 3 | 3. Tissue fixation, embedding in paraffin, microtomy and slide preparation of any endocrine gland   | 5 | DEBARSHI MONDAL |  |
| 4 | 4. 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 (proliferative and secretory stages), cervix and vagina.  | 4 | Dr. MANIDIP SHASMAL |  |
| 5 | 5. Sperm count and sperm motility in rat  | 1 | Dr. MANIDIP SHASMAL |  |

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| Semester V (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **DSE-2: Animal Biotechnology** (Theory) | Full Marks: 55 Credit: 4 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | **Unit 1: Introduction** Organization of prokaryotic and eukaryotic genome, Concept of genomics | 8 | Dr. MANIDIP SHASMAL |  |
| 2 | **Unit 2: Molecular Techniques in Gene manipulation** Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics).Restriction enzymes: Nomenclature, detailed study of Type II. Transformation techniques: Calcium chloride method and electroporation. Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Southern, Northern and Western blotting DNA sequencing: Sanger method Polymerase Chain Reaction, DNA Finger Printing and DNA micro array | 17 | Dr. SUDIPTA CHAKRABORTY |  |
| 3 | **Unit 3: Genetically Modified Organisms** Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection. Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knock out mice | 15 | Dr. MANIDIP SHASMAL |  |
| 4 | **Unit 4: Culture Techniques and Applications** Animal cell culture, expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia) | 10 | DEBARSHI MONDAL |  |

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| Semester V (AY 2023-2024) | Period : July,2023 to Jan, 2024 |
| Paper: **DSE2P**  (**Animal Biotechnology**  ) (Practical) | Full Marks: 20 Credit: 2 |
| Sl. No. | **TOPICS** | CLASSES ALLOTED | Class taken by | Remark |
| 1 | 1. Genomic DNA isolation from *E. coli*  | 2 | DEBARSHI MONDAL |  |
| 2 | 2. Plasmid DNA isolation (pUC 18/19) from *E. coli*  | 2 | Dr. SUDIPTA CHAKRABORTY |  |
| 3 | 3. Restriction digestion of plasmid DNA. | 2 | Dr. SUDIPTA CHAKRABORTY |  |
| 4 | 4. Construction of circular and linear restriction map from the data provided.  | 3 | Dr. SUDIPTA CHAKRABORTY |  |
| 5 | 5. Calculation of transformation efficiency from the data provided.  | 2 | Dr. MANIDIP SHASMAL |  |
| 6 | 6. To study following techniques through photographs a. Southern Blotting b. Northern Blotting c. Western Blotting d. DNA Sequencing (Sanger's Method) e. PCR f. DNA fingerprinting **7.** Project report on animal cell culture | 4 | Dr. MANIDIP SHASMAL |  |
| 7 | 7. Project report on animal cell culture  | 1 | Dr. MANIDIP SHASMAL |  |