**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**   |  | | --- | | 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**   |  | | --- | | 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 | | | 15 | DEBARSHI MONDAL |  |
| 3 | **Unit 3: Porifera**  General characteristics and Classification up to classes; Canal system and spicules in sponges | | 6 | DEBARSHI MONDAL |  |
| 4 | **Unit 4: Cnidaria**   |  | | --- | | 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**   |  | | --- | | General characteristics and Classification up to classes | | Life cycle and pathogenicity and control measures of *Fasciola hepatica* and *Taenia solium* | | | 6 | Dr. SUDIPTA CHAKRABORTY |  |
| 7 | **Unit 7: Nematoda**   |  | | --- | | General characteristics and Classification up to classes | | Life cycle, and pathogenicity and control measures of *Ascaris lumbricoides* and *Wuchereria bancrofti* | | Parasitic adaptations in helminthes | | | 7 | Dr. MANIDIP SHASMAL |  |

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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 |
| 1 | |  |  | | --- | --- | | **Unit 1: Introduction to Ecology** |  | | History of ecology, Autecology and synecology, Levels of organization, Laws of limiting | | | factors,Study of Physical factors, The Biosphere | | | | 4 | Dr. MANIDIP SHASMAL |  |
| 2 | |  |  | | --- | --- | | **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. | | | | 20 | Dr. MANIDIP SHASMAL |  |
| 3 | |  |  | | --- | --- | | **Unit 3: Community** |  | | Community characteristics: species diversity, abundance, , dominance, richness, | | | Vertical stratification, Ecotone and edge effect. Ecological succession with one example | | | | 11 | Dr. SUDIPTA CHAKRABORTY |  |
| 4 | |  |  | | --- | --- | | **Unit 4: Ecosystem** |  | | Types of ecosystem with an example in detail, 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 | | Nutrient and biogeochemical cycle with an example of Nitrogen cycle | | Human modified ecosystem | | | | | 10 | DEBARSHI MONDAL |  |
| 5 | |  |  | | --- | --- | | **Unit 5: Applied Ecology** |  | | Wildlife Conservation (in-situ and ex-situ conservation). | | | Management strategies for tiger conservation; Wild life protection act (1972) | | | | 5 | DEBARSHI MONDAL |  |

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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 Monosachharides  Carbohydrate 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 |  |