

FIRST SEMESTER

Core. T-101: THEORY Full Marks:50

Functional Biology of Non-Chordates and Chordates

Functional Biology of Non-Chordates (Group-A) Marks:25

1. Locomotion:
 - a) Hydrostatic movement in Cnidaria and Echinodermata
 - b) Significance of Segmentation with reference to locomotion
2. Respiration: Mechanism of respiration by gills, book lungs and tracheae
3. Nutrition: Feeding pattern in lower metazoans
4. Excretion: Structures and mechanisms of excretion in Non chordates
5. Nervous System: Primitive and advanced type of Nervous System
6. Evolutionary Significance of non-chordate larval forms

Functional Biology of Chordates (Group-B) Marks:25

1. Integument: Integument of Fishes, Integument of Tetrapods
2. Jaw Suspension: Fundamental and evolutionary significance, Cranial kinesis, Intracranial mobility in feeding mechanisms
3. Temporal region of the Reptiles and evolutionary significance
4. Evolution of cerebrum, functional association of CNS and information processing, role of cephalization in higher brain function
5. Sensory Organs: Chemoreceptors, Mechanoreceptors and Electroreceptors

Core-P-101 –PRACTICAL Full Marks:25

Functional Biology of Non-Chordates and Chordates

1. Mounting of: *Paramecium*, *Amoeba*, Cyclops, Daphnia
 2. Preparation- Mouth parts and salivary glands of cockroach, Mouth parts of Mosquito
 4. Identification of Larva: Ephyra, Nauplius, Zoea, Mysis, Megalopa, Glochidium, Trocophore, Veliger, Bipinnaria.
- Find position of accessory air-breathing organs of Anabas / Clarias / Heteropneustes
Gallus/Columba: 5th and 7th Cranial nerves

Course. Core T-102. THEORY

Full Marks: 50

Biochemistry and Environmental Physiology

Biochemistry (Group-A)

Marks: 25

1. Bioenergetics: Internal energy, First Law of thermodynamics, Enthalpy, Entropy, second law of thermodynamics
2. Conformation of proteins (Ramachandran plot)
3. Conformation of nucleic acids (A,B,Z), Reassociation kinetics and genome complexity, C-value paradox.
4. Enzymes: Kinetics and regulation
5. Regulation of Glycolysis and Citric acid cycle, Oxidative phosphorylation, electron-transfer reaction in mitochondria.

Environmental Physiology(Group –B)

Marks: 25

1. Basic concept and mechanism of Homeostasis
2. Respiration: Respiratory pigments: Oxygen dissociation curves: Transport of oxygen and carbondioxide: Bohr effect, Root effect & Haldane effect; Physiology of diving mammals (only basic concept).
3. Circulation of body fluids- Patterns of circulatory systems in animals: Conductive tissue systems of heart in mammals: Cardiac cycle: Concepts of Electro Cardio Gram (ECG)
4. Osmoregulation:
 - a) Osmoregulation-Control of osmoregulation via ADH: Osmoregulation in aquatic and terrestrial animals.
5. Thermoregulation: Concepts of terminologies used (Endotherm, Ectotherm, Homeotherm, Poikilotherm, Heterotherm, etc); Adaptations to cold and heat by aquatic & terrestrial animals; Thermal Neutral Zone; Thermogenesis, Evaporative cooling.

Course No. P-102

PRACTICAL

Full Marks:25

Biochemistry & Environmental Physiology

1. Genomic DNA extraction
2. Quantitation of DNA by UV-spectrophotometer
3. Electrophoretic separation of DNA/ Protein
4. Protein estimation by Folin Lowry method.
5. Comparison of total RBC and WBC counts in different groups of vertebrates.
6. Estimation of Haemoglobin and Differential count of blood in vertebrates

Course Core. T- 103 THEORY
Ecology & Animal Behaviour

Full Marks: 50

Ecology (A) Marks: 25

1. Community Ecology: -Biotic community concept, ecological dominance, Competition and Coexistence, intra-specific and inter-specific interactions, scramble and contest competition models, mutualism and commensalism, prey-predator interaction
2. Population Ecology: Characteristics of population, population size and exponential growth, limits of population growth, population dynamics, dispersal, concept of metapopulation.
3. Pesticides and other chemical in agriculture, industry and hygiene and trends of their use.
4. Factors influencing bioaccumulation in food chain and during trophic transfer. Impact of chemical pollutants on biodiversity of microbes, animals and plants.
5. Bioindicator and biomarkers of environmental health. Biodegradation and bioremediation of chemicals.

Animal Behaviour (Group - B) Full Marks:25

1. Ethology: Definition, Scope and Importance
2. Innate and learning behavior: Definition, classical conditioning, Instrumental learning, habituation and imprinting
3. Survival value of behavior: Kin selection, Prisoner's dilemma, selfish gene theory and green beard hypothesis
4. Foraging: Optimal foraging theory; learning and foraging; molecular, neurobiological and hormonal aspects of honey bee foraging
5. Communication: Communication and honesty; Communication venues like aggression, predation, song
6. Nidification in birds [Common (Sparrow) and water (Pond heron)] and brood parasitism

Core P- 104 PRACTICAL
Ecology & Behaviour

Full Marks: 25

1. Water Analysis: Estimation of dissolved oxygen, free carbon dioxide; total alkalinity
3. Estimation of primary productivity of aquatic ecosystems using light and dark bottle method.
4. Assessment of density, frequency and abundance of plants/animal in a community using various techniques i.e. transect, quadrat etc.
5. Study the aggressive behavior of Fish (*Channa / Betta*)

Course. Core- T-104 THEORY

Full Marks:50

Developmental Biology &Endocrinology

Developmental Biology (A) Marks:25

1. Genomic equivalence and differential gene expression: Proto-differentiation, Rutter & Wessel's experiment, Briggs & King's experiment, Gurdon's experiment.
2. Cell surface molecules in sperm-egg recognition in animals
3. Developmental genetics in *Drosophila* (only anterior-posterior axis).
4. *In Vitro* fertilization and embryo transfer technology

Endocrinology (B) Marks:25

5. Hormones and reproduction: Male and female hormones and their functions.
6. Biosynthesis: Steroid hormones and some protein hormones.
7. Diseases related to hormonal deficiency/overproduction
8. Molecular mechanism of hormone actions: c-AMP mediated hormone action Catecholamines, prostaglandins; Steroid& thyroid hormones

Core P-104 PRACTICAL

Full Marks: 25

Developmental Biology & Endocrinology

1. After incubation the eggs for different days, take out the embryo and dissect out different organs, dissociate them and observe their characteristics and behavior, fix the cells.
2. Developing organs of chick in histological sections
3. Study of life cycle of *Drosophila melanogaster*
4. Surgical techniques such as adrenalectomy, thyroidectomy, castration, etc. to be done on rats or mice.
5. Basic techniques of histology- Tissue fixation, embedding, block preparation, sectioning,stretching and differential staining (haematoxylin- Eosin)
6. Histological studies of gonads and endocrine glands in mouse/rat