SEM –II

Theory	*Module*	*Course content*	*Marks*
Paper 6	*BGCZ-08 TH*	*Chordate – structure and function*	*50*
Paper 7	*BGCZ-09 TH*	*Developmental biology*	*50*
Paper 8	*BGCZ – 10 TH*	*Animal physiology and animal behaviour*	*50*
Paper 9	*BGCZ –11 TH*	*Methods in biology - II*	*50*
Paper 10 A	*BGCZ –12 PR*	*Chordate*	*30*
Paper 10 B	*BGCZ –13 PR*	*Developmental biology, histology, physiology and endocrinology*	*30*
Paper 10C	*BGCZ –14 PR*	*Methods in biology – II Including seminar – 10*	*40*

Theory Paper – 6

Module: BGCZ – 08 TH

Chordate – Structure and Function

1. Ultrastructure and function of vertebrate integument with special reference to integumentary derivatives
2. Endostyle and its evolutionary significance
3. Jaw suspension – kinetics and evolutionary significance
4. Evolution of circulatory system in vertebrates with special reference to venous system
5. Respiratory system in vertebrates with special reference to ventiallary mechanism
6. Excretory system, kidney development, ultrastructure and special reference to JGA
7. Nervous system – evolution of cerebrum and its functional complexities, CNS and information processing
8. Sense organ – vision, hearing and tactile response
9. Evolution of primate locomotion

Theory paper – 7

Module: BGCZ – 09 TH

Developmental biology

1. The background of developmental biology
2. Characteristics of development
3. Embryological heritage (Epigenesis and preformation)

4. Developmental genetics – genome equivalence and the cytoplasmic determinants; The central position of developmental biology; imprinting; mutants and transgenesis in analysis of development
5. Potency of embryonic cell : types of potency, pluripotency and stem cells, stem cell vs. progenitor cells, restriction nuclear potency (nuclear transfer experiments)
6. Commitment of cells (specification and determination), differential cell affinities and adhesion of cells (Morphogenesis), morphogenetic gradients, cell fate and cell lineages
7. Cell – cell communication: Induction and competence (Lens development), paracrine factors for communication (FGF, Hedgehog family etc.)
8. Genetic control of development: early development in model systems – Caenorhabditis elegans (Nemtodes); Axis formation in Drosophila, chick and mouse.
9. Post embryonic development.
10. Metamorphosis (Hormonal control in Amphibia and insects)
11. Regeneration (Blastomere in Amphibian limb, Hypostome as an organizer in Hydra)
12. Applied developmental : in vitro fertilization, genes for developmental anomalies, in born errors in transcriptional regulation; amniocentesis, foetal sex determination and teratogens
13. Evolutionary development : the concept of evo – devo, Hox genes, Von bears law
14. Aging and senescence

Theory paper - 8

Module: BGCZ – 10 TH

Animal physiology & behaviour

Animal physiology:

1. Blood and circulation : blood corpuscles, haematopoiesis and formed elements, plasma, blood volume, blood volume regulation, blood groups, haemoglobin, immunity, haemostasis
2. Cardiovascular system: comparative anatomy of heart structure, myogenic heart special tissue, ECG – its principle and significance, cardiac cycle, heart as pump, blood pressure, neural and chemical regulation of all above.
3. Respiratory system : comparison of respiration in different species, anatomical consideration, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration
4. Nervous system: neurons, action potential, gross neuroantomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture.
5. Sense organ: vision, hearing and tactile response.
6. Excretory system: comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, maturation, regulation of water balance, blood urine, blood pressure, electrolyte balance, acid-base balance.
7. Thermoregulation: comfort zone, body temperature – physical, chemical neural regulation, acclimatization.
8. Stress and adaptation
9. Digestive system : digestion, absorption, energy balance, BMR

10. Endocrinology and reproduction: endocrine glands, basic mechanism of hormone action, hormones and disease, reproductive processes, neuroendocrine regulation.

BEHAVIOUR:

1. Innate and learned behaviour, neural and hormonal control of behaviour.
2. Ecological aspects of behaviour, aggression, homing territoriality, dispersal.
3. Habitat selection, food selection, and foraging theory.
4. Aspects of socio-biology – social communication, social dominance, altruism and reciprocal altruism.
5. Game theory.
6. Group selection.
7. Reproductive behaviour: mating system and courtship
8. Domestication and behavioural changes
9. Male – male competition and sexual selection – Fisher's hypothesis and handicap hypothesis, parent offspring conflict, range of co-operative behaviour and Prisoner's dilemma

Theory: Paper – 9

Module: BGCZ – 11 TH

Methods in biology – II

1. Polymerase chain reaction
2. RFLP, RAPD, AFLP & forensic utilities
3. Genomics – Principles
4. In situ hybridization: FISH, GISH AND FACS
5. Spectroscopy, NMR, ESR, CD, ORD, Fluorescence, IR
6. Radioactivity and counting – autoradiography, liquid scintillation counter, Cerenkov
7. Pollution – methods of monitoring - water, air & noise pollution & hazard, green house effect, global warming, bioremediation
8. Biodiversity – conservation and management strategies, monitoring
9. Environmental impact assessment(EIA)
10. Statistical method – central tendency, dispersion, distribution (Binominal, Poisson and normal), correlation and regression, ANOVA
11. Integrated pest management (IPM)

PRACTICAL

Practical: Paper 10 A Chordate

Module – BGCZ – 12 PR

Identification of museum species.

Tilapia – Olfactory Apparatus, urinogenital system & otolith

Carp – Weberian ossicles, swim bladder

Practical – paper 10 B (Developmental biology, Histology & Endocrinology)

Module – BGCZ – 13 PR

1. Preparation of one stage of chick embryo
2. Studies of developmental stages of tadpole
3. Histological Staining : PAS, Chromate – dichromate, Trypan blue & NBT cell viability tests, Estrous cycle of albino rats
4. Staining & Identification : Bursa of Fabricius, Spleen, Thymus, Tonsil, Adenoid, Stomach, Intestine, Tongue, Lungs, Uterus

Paper – 10 C (Methods in Biology II)

Module – BGCZ – 14 PR

1. Microbial culture maintenance
2. Gram staining of bacteria
3. ELISA
4. PCR
5. Cell fractionation
6. Quantitative and qualitative estimation of planktons
7. Water analysis – DO, CO, BOD
8. Soil analysis – Edhaphic Factors & Biotic community
9. Studies of Pests (One Local Field Trips)
10. Statistics : Probability Distribution, ANOVA