

SEM-III

Theory	Module	Course Content	Marks
PAPER 11	BGCZ-15TH	Parasitology, Microbiology& Immunology	50
PAPER 12	BGCZ-16TH	Cytogenetic and Molecular Biology	50
PAPER 13	BGCZ-17TH	Applied Biology and Quantitative Biology	50
PAPER 14	BGCZ-18TH	Elective paper	50
PAPER 15A	BGCZ-19PR	Immunology, Microbiology &Parasitology	30
PAPER 15B	BGCZ-20PR	Cytogenetic and Molecular Biology	30
PAPER 15C	BGCZ-21PR	Elective paper & Seminar (10)	40

Theory: Paper 11

Module –BGCZ-15 TH

Parasitology, Microbiology & Immunology

50

Parasitology

1. Evolution of parasitism
2. Pathogenicity of parasitic diseases
3. Biology of important parasites
4. Zoonosis and its significance
5. Vector Biology
6. Mysis and its implication
7. Parasitic diseases of veterinary, poultry and public health including Ocarina Diseases.

Microbiology

1. Classification and biology of Microbes (Bacteria, virus & Protozoa).
2. Control of Microbes Antibiotics.

3. Bioluminescence.
4. Microbial Diseases.

Immunology

1. Cell and Molecules involved in innate and adaptive immunity.
2. Antigen processing, presentation and MHC (special syllabus).
3. Monoclonal antibody, uses Abysm.
4. B & T cell Cooperation.
5. Inflammation & Hypersensitivity.
6. Vaccines.
7. Immunological techniques.

Theory: Paper 12

Module – BGCZ-16 TH

Cytogenetic and Molecular Biology

50

1. Extension of Mendelian Principal: Gene Interaction, Penetrance, Expressivity, Phenocopy, Sex limited & Sex influenced Traits.
2. Extra chromosomal inheritance
3. Microbial Genetics – Transformation, Conjugation & Transduction.
4. Human Genetics – Genetic Disorder, Genetic Counselling
5. Mutation – in vitro & site directed Mutagenesis
6. Recombination – Holliday structure
7. Transposition
8. Cloning – vectors, Restriction enzymes, restriction mapping, expression.
9. Hybridization – Southern, Northern & South-western blotting
10. Different type of PCR & their Utilities
11. Fingerprinting, Footprinting, RAPD, RELP

12. Sequencing –Basics

13. Transgenesis

Theory: Paper 13

Module – BGCZ-17 TH

Applied Biology & Quantitative Biology

50

APPLIED BIOLOGY

1. Microbial fermentation and production of small and macro molecules
2. Application of immunological principles (vaccines, diagnostics)
3. Genomics and its application to health and agriculture, including gene therapy.
4. Bioremediation and phytoremediation.
5. Biosensors
6. Recent advances in Fisheries Sciences and Aquaculture – preservation, integration of aquaculture, non-conventional aquaculture, fresh water and brackish water prawn culture.
7. Vermicomposting, Vermireactors, biogas production and gas plant
8. Proteomics
9. Applied Entomology – Insect & Acarines pest: Assessment of pest status, EIL & ETL etc. Important pest of jute, paddy, sugarcane, vegetable, mango, tea, stored product and forest insects – their distribution, nature of damage, biology and control measures.
10. Medical Entomology – (a) Mosquito vectors, types, role in disease transmission, case studies – malaria and filaria (b) Sandflies – morphology, life cycle, vector status, disease relationship, (c) Flies – types, role in disease transmission, case studies – myiasis (d) Acarines of medical importance –
 - i) Scabies – morphology and life cycle of the causative agent, habit and habitat, mode of transmission, pathogenesis and control.
 - ii) Trombiculid mites: morphology, habit and habitat, life cycle and medical importance.
 - iii) Ticks: general consideration, hard and soft ticks – external morphology, internal anatomy, life cycle, disease relationship, and control measures.

- iv) Allergic mites: General account, mechanism, control measures.
- 11. Modern hatcheries and management.

QUANTITATIVE BIOLOGY

1. Application of computer in biology.
2. Measures of central tendency and dispersal.
3. Probability distribution (Binomial, Poisson and Normal)
4. Sampling distribution
5. Difference between parametric and non-parametric statistics
6. Confidence level and errors levels of significance.
7. Regression and Correlation.
8. t-test (paired, unpaired)
9. χ^2 –tests (goodness of fit, contingency, homogeneity)
10. Analysis of variance (ANOVA).

Theory: Paper 14

Module – BGCZ-18 TH

Elective paper: Parasitology and immunology

50

1. Classification and Evolution of parasites (Protozoa and Helminthes)
2. Ultrastructure of important protozoa and Helminthes
3. Metabolism (Carbohydrate, Protein) of Protozoa and Helminthes
4. Life cycle pattern of important Protozoa and Helminthes
5. Epidemiology – general & landscape epidemiology, epidemiology of malaria, Leishmania, filarial etc.
6. Epidemiological methods.
7. Vectors and its importance in transmission of parasites.
8. Nosology with respect to Protozoa & Helminthes.

9. Acarines of medical, veterinary & public health importance
10. Free living Amoeba & potential pathogenic forms.
11. Structure and function, expression of antibody, various types of body cells and organs of immune system.
12. Antigen-Antibody reaction and its role in clinical parasitology; common methods like GDP, CIEP, ELISA, immunoblot, IFA, MCAB etc.
13. Hypersensitivity.

Elective paper: Cell and Molecular biology

Cell:

1. Nucleus: Envelope, lamina, pore complex, nucleolus ultrastructure, ribosome biogenesis, nuclear reticulum.
2. Origin of eukaryotic cell: Independent hypothesis, endogenous theory, chimera hypothesis, endosymbiotic theory, SET, syntrophy hypothesis.
3. Cell cycle: Synaptonemal complex, MTOCs and spindle apparatus, molecular mechanism of events in M phase, Anaphase movement, Genetics of apoptosis.

Chromosome:

1. DNA: Chargoff's rules, A, B, Z DNA, C value paradox, unique and repetitive DNA, Tm and Cot values, CHROMOSOME: Banding and Satellite. RNA: Genetic and nongenetic RNA, Ribozyme and RNA world, antisense RNA, RNA editing.
2. Chromosomal aberrations: Isochromosomes, sister chromosome exchange, detection of chromosomal aberrations, CA and human disease.
3. Mutation: Clastogen, Teratogens and Carcinogens, Ames test, Alkylation, Deamination, Depurination, DNA distortion, Dimerisation, Fluctuation test (Bacteria), Role of mutation in evolution.

Molecular genetics:

1. Cloning: Vectors, plasmids, phages, cosmids, BAC, YAC, R/E, restriction mapping, ligation, selection expression, fusion protein preparation, Genomic and cDNA libraries.
2. Hybridization: southern, northern and western blotting, Screening of libraries, Colony hybridization, Dot blots, DNA microarray.

Theory: Paper 14

Module – BGCZ-18 TH

Elective Paper: Ecology & Environmental Biology

50

Ecosystem and its Components

1. Biotic and Abiotic components
2. Energy flow and budget, Food chain and food web and ecological pyramid.
3. Importance of trophic level and trophic level score.

Community Ecology

1. Major Indian Ecosystem with special reference to marine, lake, forest and wetland, Ecosystem.
2. Community analysis, ecological successions, ecotone edge effect.
3. Photoperiodism, biological clock, circadian rhythm.
4. Water balance in animals
5. Temperature and molecular effects thermal adaptation, hibernation & aestivation.
6. Deep diving animal.

Ecological Modeling

1. Ecosystem modeling
2. Prey Predator System Modelling

Biodiversity & Wildlife

1. Wild life ecosystem- Wild life weather of India, Reasons for wild life depletion in India, wild life habitat characteristics, fauna adaptations with special reference to tropical forest, Protected area concept, National park, Sanctuaries, Biosphere reserve, Core & buffer, nodes & corridors, Wild life management, Captive breeding of wild animals of wild animals, Special management Programme of wild animals in India- Operation Rhino, Project Elephant, Project Tiger, Wild life trade, Wild life legislation Wild life census – Bird counting, pug mark etc.

2. Species ecosystem and genetic diversity, Mega diversity, Hotspot Mearns Wilson Model, Extinction, Vortices Model etc.

Natural Resources and Environment Management

1. Global environment picture.
2. Human Population, Expansion AND its causes.
3. Effect of human population on nature resources: Water resource management, Soil degradation and its management.
4. Renewable energy: Promise of solar energy, indirect solar energy, Biofuel, Addle, Renewable energy.
5. Environment impact assessment, Environment risk management, Environment bio-monitoring – Methods and tools.
6. Advances in past management and IPM
7. a) Waste water management (primary, secondary and advanced) Waste water disposal and reuse.
b) Types of soil wastes, processing and reuse of solid wastes.

PRACTICAL

PRACTICAL:

PAPER 15A

Module-BGCZ-19PR

Immunology, Microbiology & Parasitology **30**

1. Identification of parasites and microbes
2. Fixation, Staining and Identification of Fish Parasites
3. Culture of a bacteria and counting of Colonies
4. Identification of Immunological tissues
5. Slide Agglutination Test
6. Demonstration of Immunization processes-I p

PAPER 15B

Module-BGCZ-20PR

Cytogenetic and Molecular Biology

30

1. Chromosome Preparation from Drosophila larva & camera Lucida drawing
2. Meiotic chromosome In Grasshopper
3. Genetic Crosses in Drosophila
4. DNA isolation & assays
5. Gel electrophoresis & Staining of DND

PAPER 15C

Module-BGCZ-21PR

Parasitology & Immunology

30

1. Post Mortem Investigation of invertebrates & vertebrates for protozoan, helminthes, arthropods and ectoparasites; their fixation, preservation, staining & mounting
2. Staining methods: Blood smear, gut smear, seminal vesicle of different vertebrates and invertebrates.
3. Identification of Parasites & related tissues
4. Preparation of Antigen
5. Immunization processes (Demonstration)

Cell and molecular biology

1. Chromosome preparations – Rat bone marrow, Drosophila, Human blood
2. Problems and case study:
 - a. Pedigree analysis
 - b. Hybrid dysgenesis
 - c. Genetic crosses
 - d. Genetics of hemoglobin biosynthesis
3. Preparation, purification and detection of amount of Cellular and Plasmid DNA.

Ecology and Environmental Biology

1. Evaluation of effect of toxicant on tissues – Histochemical & biochemical changes

2. Biological Oxygen Demand of Water
3. Preparation of vermibeds and vermicast collection
4. Ecological comment on blood parasite, gut parasite
5. Evaluation of LC 50/LD 50 by Probit analysis
6. Visit to waste water treatment plant/ Thermal Power plant / Visit
7. Laboratory note book
8. Vive Voce