GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR – 639 005

M.SC., ZOOLOGY COURSE STRUCTURE UNDER CBCS SYSTEM

(For the candidates admitted from the year 2015-2016 onwards)

SEMESTER	COURSE	SUBJECT TITLE	SUBJECT CODE	INSTR. HOURS WEEK	CREDIT	EXAM HOURS	MARKS		TOTAL
							INT	ESE	
I	Core Course – I	Biology of Invertebrates and chordates	P15ZO1C1	6	5	3	**25**	**75**	100
	Core Course – II	Microbiology and Immunology	P15ZO1C2	6	5	3	**25**	**75**	100
	Core Course - III	Biotechnology	P15ZO1C3	6	5	3	**25**	**75**	100
	Core Course – IV	Practical – I (CCI, II & III)	--	3	*	*	*	*	*
	Core Course – V	Practical – II (CCVI, VII & VIII)	--	3	*	*	*	*	*
	Elective Course-I	General and Applied Entomology	P15ZO1E1	6	5	3	**25**	**75**	100
				30	**20**				**400**
II	Core Course – IV	Practical – I (CCI, II & III)	P15ZO2C4P	3	5	3	**25**	**75**	100
	Core Course – V	Practical – II (CCVI, VII & VIII)	P15ZO2C5P	3	5	3	**25**	**75**	100
	Core Course – VI	Cell and Molecular Biology	P15ZO2C6	6	5	3	**25**	**75**	100
	Core Course – VII	Genetics and Evolution	P15ZO2C7	6	5	3	**25**	**75**	100
	Core Course - VIII	Developmental Biology	P15ZO2C8	6	5	3	**25**	**75**	100
	Elective Course-II	Applied Zoology	P15ZO2E2	6	5	3	**25**	**75**	100
				30	**30**				**600**
III	Core Course – IX	Animal physiology and Behaviour	P15ZO3C9	6	5	3	**25**	**75**	100
	Core Course – X	Biomolecular Chemistry	P15ZO3C10	6	5	3	**25**	**75**	100
	Core Course-XI	Ecology and Toxicology	P15ZO3C11	6	5	3	**25**	**75**	100
	Core Course –XII	Practical - III (Covering CC-IX & X, EC I & EC II)	--	3	*	*	*	*	*
	Core Course – XIII	Practical – Iv (CC XI, EC III & EC IV)	--	3	*	*	*	*	*
	Elective Course - III	Research Methodology Biostatistics and Bioinformatics	P15ZO3E3	6	5	3	**25**	**75**	100
				30	**20**				**400**
IV	Core Course –XII	Practical - III (Covering CC-IX & X, EC I & EC II)	P15ZO3C12P	3	5	3	**25**	**75**	100
	Core Course – XIII	Practical – Iv (CC XI, EC III & EC IV)	P15ZO4C13P	3	5	3	**25**	**75**	100
	Elective Course - IV	Biophysical tools and Techniques	P15ZO4E4	6	5	3	**25**	**75**	100
	Project Work	Project Work	P15ZO4PW	18	5	3	**	**	100
				30	**20**				**400**
TOTAL				**120**	**90**				**1800**

** Dissertation – 80 Marks and Viva Voce Examinations – 20 Marks

* Practical Examinations in the Even Semester.

CHAIRMAN
BOARD OF STUDIES IN ZOOLOGY

CONTROLLER OF EXAMINATIONS

Sl. No.: | **Subject Code:** P15ZO1C1

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – I SEMESTER – CORE COURSE - I

(For the candidates admitted from the year 2015-16 onwards)

BIOLOGY OF INVERTEBRATES AND CHORDATES

UNIT- I

Symmetry - Asymmetry, Radial, Biradial and Bilateral symmetry - Significance
Coelom - Acoelomate, Pseudocoelomate, and Coelomate groups (Schizocoel, Enterocoel, Mesenchyme) – Significance.
Metamerism - Pseudometamerism, Cyclometamerism, Corm theory, Embryological Theory - Significance
Locomotion: Movement in Annelids, Molluscs and Prochordates
Nutrition: Filter feeding in Polychaetes, Molluscs and Prochordates.

UNIT-II

Respiration: Gills and Trachea in Arthropods, Respiration in Molluscs.
Circulation: Circulation in Arthropods and Molluscs.
Excretion: Different types of excretory organs in Invertebrates - their structure and functions
Nervous System: Primitive Types - Coelenterates and Nerve net, Advanced types- Nervous system in Annelids, Arthropods and Molluscs.

UNIT-III

Chemical coordination: Endocrine glands in Crustaceans and Insects-Pheromones and allelochemicals.
Reproduction: Patterns of Asexual and Sexual Reproduction- Invertebrate Larval forms and their significance
Minor Phyla: Organisation and Affinities of Chaetognatha and Phoronida.

UNIT- IV

Comparative study, structure and function of the following system in vertebrates
Integumentary System: Exoskeletal Structures and their Modifications
Digestive system: Alimentary Canal and Associated Glands.
Respiratory System: Gill Respiration in Cyclostomes and Fishes and Pulmonary Respiration in Tetrapods.
Circulatory System: Types of Heart and Aortic Arches
Excretory system: Types of Kidney.

UNIT – V

Comparative study of the following system in vertebrates
Nervous System: Brain and Spinal cord, Cranial, Spinal and Visceral Nerves, Autonomic Nervous System - Sympathetic and Parasympathetic Nervous System
Reproductive System: Reproductive Structures and Accessory Reproductive Glands.

Text Books:

1. Kotpal, R.L., Agarwal, S,K. and Khetarpal, R.P.R.,1989, Modern Text Book of Zoology, Rastogi Publications, Meerut

References:

1. Hyman, G.H., 1940, The Invertebrates, Vo1.I to VII, McGraw Hill Book Co., Inc., N.Y.
2. Weischert, C. K., 1965, Anatomy of Chordates, McGraw Hill Book Co., Inc., N.Y.
3. Romer, A.S., 1979, Hyman's Comparative Vertebrate Anatomy, 3rd Ed., The University of Chicago Press, London.
4. Barnes, R.D., 1974, Invertebrate Zoology, 4th Ed., Holt Saunders International Edition

CHAIRMAN – BOS **COE**

Sl. No.: | **Subject Code:** P15ZO1C2

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – I SEMESTER – CORE COURSE - II

(For the candidates admitted from the year 2015-16 onwards)

MICROBIOLOGY AND IMMUNOLOGY

UNIT- I

General microbiology:

Bacteria -Taxonomy, Structure, Recombination, Growth, Nutrition, Culture - Types of Media and Conditions for Culturing.

Viruses -Taxonomy, Structure and Life Cycle of Viruses-T4 Phage and HIV, Viroids and Prions.

UNIT-II

Medical microbiology:

Infectious Diseases - Causative Agents, Modes of Transmission and Control of Polio, Dengue, AIDS. Tuberculosis, Diphtheria, Typhoid, Syphilis and Gonorrhea. Prevention and Control of microorganisms - Physical and Chemical Methods. Antibiotics and Other Anti-microbial Agents and Mechanism of Drug Resistance.

UNIT-III

Scope of Immunology - Types of Immunity - Innate and Acquired, Passive and Active. Primary and Secondary Lymphoid Organs - Structure and Function of Bone Marrow, Thymus, Spleen, Bursa of Fabricius, GALT, BALT, MALT and Lymph Nodes. Cells of Immune System - Origin and Differentiation of T & B Cells and Macrophage. Antigens - Class Determinants - Reactive Sites and Receptor Sites.

UNIT-IV

Antibody - Immunoglobulin - Primary Structure - Classes, Functions, Synthesis. Hybridoma technology Monoclonal Antibodies and their Applications. Genetic Mechanisms in Generation of Antibody Diversity - Regulation of Antibody Diversity. Complement - Classical and Alternative Pathways and Immunological Significance- Antigen antibody reaction.

UNIT-V

Major Histocompatibility Complex (HLA) and its Products in Man. Transplantation Immunology, Tumour Immunology - Immune Deficiency Diseases – AIDS - Autoimmune Diseases – Examples - Concept and Mechanisms - Types of Hypersensitivity.

Text Books:

1. Powar, C.B.and Daginawala. H.F., 1982, General Microbiology Volume I &II, Himalayas Publishing House, Mumbai.
2. Ananda narayanan, T. and Jayram Paniker, C.K., 2000, Textbook of Microbiology, 6th Ed. Orient Longman Ltd., Chennai.
3. Kannan, I., 2011, Immunology, MJP publishers, Chennai.
4. NandhiniShetty, 1996, Immunology: Introductory Text Book New Age International Pvt.Ltd., New Delhi.

References:

1. Pelczar, M.J., Reid, R.D. and Chan. E.C.S, 2002, Microbiology, 5th Ed. Tata McGraw Hill Publishing Co.Ltd., New Delhi.
2. Barbara J. Howard., 1994, Clinical and pathogenic Microbiology. The C V Mosby Company
3. Kuby,J.1994, Immunology, W.H. Freeman & Co., NewYork.
4. Roitt, M.I., 1994, Essential Immunology, Blackwell Science Ltd., UK
5. Sells, S., 1987, Basic Immunology, Elsiever Science Publishing Co., New York.

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Sl. No.: **Subject Code:** **P15ZO1C3**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – I SEMESTER – CORE COURSE - III

(For the candidates admitted from the year 2015-16 onwards)

BIOTECHNOLOGY

UNIT- I

Tools and Techniques of Genetic Engineering: Basic Principles of Genetic Engineering; Restriction enzymes, Linkers/Adaptors; Cloning Vectors - Salient Features and Types - Plasmids, Phages, Cosmids, Phagemids, BAC, YAC, Transposons, Shuttle and Expression Vectors; Techniques – Strategies of rDNA Technology, Gene Library, Insertion of a Foreign DNA into a Vector, Transfer of rDNA into a Bacterial Cell, Selection & Screening of Recombinants, Blotting Techniques, Recovery of Cells containing rDNA, Expression of Cloned DNA, Detection of Nucleic Acids.

UNIT- II

Industrial & Environmental Biotechnology: Fermentation - Types, Fermenter Designs, Upstream and Down Stream Processing, Product Recovery and Purification; Production of Alcohol, Aminoacids, and Vitamins.

Biofuels, Bioremediation, Biodegradation, Biomining & Biosorption.

UNIT-III

Animal biotechnology: Biosafety, Equipments for animal cell culture, Types of tissue culture medium, Primary culture, Stable cell line, Cultivation of Animal Cells in a Bioreactor; Somatic Cell Fusion, Applications of Cell Culture - tPA Blood Factor VIII, and Erythropoietin; Organ Culture; Transgenic Animals - Transgenic Goat.

UNIT IV

Enzyme Biotechnology: Microbial Production of Enzymes, Immobilisation of Enzymes and its applications.

Agricultural Biotechnology: -*Agrobacterium* as a natural genetic engineer; Single Cell Protein, Nitrogen fixation- nitrogen fixing organisms, mechanism and genetics of fixation; Bio-pesticides; Biofertilizers.

UNIT-V

Medical Biotechnology: Production of Antibiotics, Hormones, Vaccines, Interferons, Diagnosis of Diseases MAbs, Molecular Markers in Forensic science- RFLPs, RAPD, AFLP, VNTR and Microsatellites, Diagnosis of diseases, Gene Therapy - Germ Line Gene Therapy & Somatic Cell Line Gene Therapy.

Text Books:

1. Kumaresan, V., 2006, Biotechnology, Saras Publication, Nagercoil.
2. Dubey, R.C., 2008, A Text book of Biotechnology, S.Chand & Co., New Delhi.

References:

1. Gupta, P.K., 2006, Elements of Biotechnology, Rastogi Publications, Meerut.
2. Lewin, B., 2002, Gene XI , Oxford University Press, New York.

CHAIRMAN – BOS **COE**

Sl. No.: | **Subject Code:** P15ZO1E1

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – I SEMESTER – ELECTIVE COURSE - I

(For the candidates admitted from the year 2015-16 onwards)

GENERAL AND APPLIED ENTOMOLOGY

UNIT- I

Taxonomy- Basics of Insects Classification, Classification up to Super Family Level, Key Characteristics with South Indian Examples.

UNIT- II

External anatomy and Growth:

External Anatomy of a Typical Insect - Exoskeleton, Head, Thorax, and Abdomen. Mouth Parts in Insects, Different Types of Larvae and Pupae - Growth and Metamorphosis of Insects,

UNIT-III

Physiology of Insects - Digestive System, Excretory System, Respiratory System, Circulatory System Nervous System and Sense organs, Reproductive System, Endocrine System and Pheromones.

UNIT-IV

Ecology of Insects - Abiotic Factors Affecting Insects - Temperature, Moisture, Air-currents, Diapause, Light, Food, Habitat - Terrestrial and aquatic, Biotic factors - Capacity for Increase, Protection, Competition Parental Care, Trophyllaxis, Commensalism, Captives, Food Storage, Natural Enemies, Insects and Plant associations, and Social Insects.

UNIT-V

Medical Entomology: Vectors, Vector borne diseases and their control.

Agricultural Entomology: Insect Pest of Crops and their control measures: Paddy, Groundnut, Coconut, Cotton. Sugarcane, Brinjal, Lady's finger, Pests of Stored grains. Pest Control: Prophylactic, Mechanical, Chemical and Biological Control measures. Integrated Pest Management.

Text Books:

1. Ambrose Dunston P., 2004, The Insects: Structure, Function and Biodiversity, Kal;yani Publishers, Ludhiana.
2. Vasantharaj David, B. and Kumaraswami, T., 1982, Elements of Economic Entomology, Popular Book Depo, Chennai.

Reference Books:

1. Chapman, R.F., 1998, The Insects: Structure and Function, Cambridge University Press.
2. Nayar, K.K., T.N. Ananthakrishnan, and B.V.David, 1986, General and Applied Entomology, Tata McGraw Hill Publishing House, New Delhi.
3. Wigglesworth, V.B., 1979, Principles of Insect Physiology, 9th Ed. Chapman & Hall, London.
4. Snodgross, R.E., 1985, The Principles of Insect Morphology, McGraw Hill & Co., New York.
5. Tembhare, D.B., 2012, Modern Entomology, Himalaya Publishing House, Mumbai.

CHAIRMAN – BOS **COE**

Sl. No.: | **Subject Code:** P15ZO2C4P

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – II SEMESTER – CORE COURSE - IV

(For the candidates admitted from the year 2015-16 onwards)

PRACTICAL – I (CCI, CCII & CCIII)
(BIOLOGY OF INVERTEBRATES AND CHORDATES, MICROBIOLOGY AND IMMUNOLOGY & BIOTECHNOLOGY)

A. BIOLOGY OF INVERTEBRATES & CHORDATES

l. Taxonomy:
Identification and Classification of at least 50 representative animals belonging to major classes of Invertebrate phyla and phylum Chordata by studying their salient features.

2. Mounting:
Nereis sp. - Parapodium, Prawn appendages, Teleost Fish – Placoid. Cycloid, Ctenoid scales, Honey bee - Sting apparatus and Mouth parts.

3. Spotters:
Invertebrate Larval forms, Minor Phyla - *Chaetognatha*, *Phoronida*, and *Sipunculida*.

4. Dissections:
Demonstration -Dissections Arterial System and Cranial nerves- Shark, Frog, Calotes and Rat Using Video Clippings.

B. MICROBIOLOGY AND IMMUNOLOGY

Culture Techniques - Culture of Bacteria, Bacterial Growth Curve, Preparation of Smears, Simple Staining and Gram Staining.
Identification of lymphoid organs in rat / mouse.
Preparation of antigen and raising of antibody in Fish.
Determination of human blood group and Rh typing by haemagglutination test
Detection of the presence of precipitating antibody (IgG) with soluble antigens by precipitin
ring test.

Spotters: Micrometer, Microscope, Autoclave, Petri dish, Inoculation loop, Colony counter, Laminar Air Flow Chamber.Antibody structure –model, Immunoelectrophoresis, ELISA reader

C. BIOTECHNOLOGY

Isolation of DNA from tissues - Plasmid isolation (Demonstration only)
DNA fragmentation using restriction enzymes.
Spotters: Plasmid - pBR 322, PCR, Transgenic animal-Dolly,
CO2 incubator, Bioreactor, Spinner flask.

A Record of laboratory work shall be submitted at the time of practical examination
Mark distribution for the Practical Examination:

Invertebrata & Chordata Taxonomy	**: 16 (4 x 4 = 16)**
Invertebrata & Chordata Mounting	**: 08 (1 x 8 = 8)**
Microbiology Immunology	**: 15**
Biotechnology	**: 10**
Spotters (Microbiology & Immunology-2 & Biotechnology -2)	**: 16 (4 x 4 = 16)**
Record	**: 10**
Total	**: 75**

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Sl. No.: | **Subject Code:** P15ZO2C5P

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – II SEMESTER – CORE COURSE - V

(For the candidates admitted from the year 2015-16 onwards)

PRACTICAL – II (CCVI, CCVII & CCVIII)
(CELL AND MOLECULAR BIOLOGY, GENETICS AND EVOLUTION & DEVELOPMENTAL BIOLOGY)

A. CELL AND MOLECULAR BIOLOGY

1. Micrometry - Measuring the Diameter of Microscopic Cells Using Ocular and Stage micrometer
2. Human Buccal Smear
3. Smear and staining of Haemolymph of cockroach and Blood of human being.
4. Blood Cells as Osmometers.
5. Cytochemical Detection of Carbohydrates, Protein, Lipid, DNA and RNA
6. Study of Mitosis in the Cells of Onion Root Tip
7. Observing the Giant chromosomes in the salivary glands of larva of *Chironomus* sp.

Spotters: Centrifuge, Homogenizer, Epithelial Tissues (Ciliated, Columnar, Glandular and Squamous epithelium), Smear of Frog's Blood, Muscles (Cardiac, Striated and Non - Striated) and Nerve cell

B. GENETICS AND EVOLUTION

1. Recording Mendelian Traits in Human Beings
2. ABO and Rh Blood Groups and their Genetic Significance –
3. Hardy - Weinberg Law & Calculation of Gene Frequency of Dominant and Recessive

Spotters: Normal Human Karyotype, Down syndrome, Klinefelter's syndrome, Turner's syndrome, Drosophila male and female, DNA and RNA model
Fossils: Ammonoids, Belemnoids, Nautiloids and Echinoderm fossils

C. DEVELOPMENTAL BIOLOGY

Preparation of Sperm Suspension and Observation of Spermatozoa in bull semen.
Study of Rate of Motility of Sperm in Bull Semen
Effect of Thyroxine or Iodine on Metamorphosis of Frog (Demonstration)

Spotters:
Frog's / Human's sperm, Frog's Egg, 2-Celled Stage, 4-Celled Stage, 8-Celled Stage, 16 Celled Stage, Yolk Plug Stage, Blastula, Gastrula - T.S. of Mammalian Testis & Ovary, Chick Embryo : Primitive Streak, 24 hrs, 48 hrs and 72 hrs Chick Embryo.

A Record of laboratory work shall be submitted at the time of practical examination
Mark distribution for the Practical Examination:

Cell and Molecular biology	: 20
Genetics and Evolution	: 10
Developmental Biology	: 15
Spotters (CMB.-1 & GE-2 and DB -1)	: 20 (4 x 5 = 20)
Record	: 10
Total	**: 75**

CHAIRMAN – BOS **COE**

Sl. No.: Subject Code: P15ZO2C6

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – II SEMESTER – CORE COURSE - VI

(For the candidates admitted from the year 2015-16 onwards)

CELL AND MOLECULAR BIOLOGY

UNIT- I

Membrane structure and function: Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, ion pumps, mechanism of sorting and regulation of intracellular transport, electrical properties of membranes.

UNIT- II

Structural organization and function of intracellular organelles: Cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplast, structure & function of cytoskeleton..

UNIT - III

Cell division and cell cycle: Mitosis and meiosis, their regulation, steps in cell cycle, and control of cell cycle. Growth, yield and characteristics, strategies of Mitosis and Meiosis, stress response.

UNIT -IV

Organization of Genome: Operon, interrupted genes, gene families, structure of chromatin and chromosomes, heterochromatin, euchromatin, transposons.

Structure, Forms or Types of DNA and RNA, DNA replication and repair RNA synthesis and processing; Protein synthesis and processing:

Control of gene expression at transcription and translation level in prokaryotes and eukaryotes

UNIT V

Cell signaling: G-protein coupled receptors, Signal transduction pathways Regulation of signaling pathways.

Cellular communication: Principle, Cell adhesion, Gap junctions, extracellular matrix and integrins.

Cancer: Oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis. Immune response to cancer.

Text Books:

1. DeRobertis, E.D.P. and DeRobertis, E.M.E., 1987, Cell and Molecular Biology VIII Ed. Lea and Febger, Philadelphia.
2. David Freifelder, 1998, Molecular Biology, II Ed. Narosha Publishing House, New Delhi.

Reference books:

1. Powar, C.B., 1985, Cell Biology, Himalayas Publishing House, Bombay.
2. Lewis, Keleinsmith and ValerisM.Kish 1988, Principles of cell biology, Harper and Row Publications, New York.
3. Prakash S.Lohar, 1965, Cell and Molecular Biology, MJP Publishers, Chennai.
4. Gupta, M.L. and Jangir, M.L., 2003, Cell Biology Fundamentals and Application, Student Edition, Jothpur.

CHAIRMAN – BOS **COE**

Sl. No.: Subject Code: P15ZO2C7

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – II SEMESTER – CORE COURSE - VII

(For the candidates admitted from the year 2015-16 onwards)

GENETICS AND EVOLUTION

Unit I

History and concept of Genetics, Linkage and crossing over, Sex linkage, sex limited and sex influenced characters. Extra chromosomal inheritance: Inheritance of mitochondrial genes, maternal inheritance.

Recombination: Homologous and non-homologous recombination, including transposition, site-specific recombination

Gene mapping methods:

Linkage maps, mapping with molecular markers, mapping using somatic cell hybrids,

Unit II

Microbial genetics: Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating, fine structure analysis of genes.

Human genetics: Pedigree analysis, lod score for linkage testing, karyotypes, Genetic disorders: Chromosomal Syndromes, Gene based disorders, mitochondrial gene disorders.

Unit III

Quantitative genetics: Polygenic inheritance, heritability and its measurements, QTL mapping.

Mutation: Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis.

Structural and numerical alterations of chromosomes: Deletion, duplication, inversion, translocation, ploidy and their genetic implications.

Unit IV

Origin of cells and unicellular evolution: Origin of basic biological molecules; abiotic synthesis of organic monomers and polymers; concept of Oparin and Haldane; experiment of Miller; the first cell; evolution of prokaryotes; origin of eukaryotic cells; evolution of unicellular eukaryotes; anaerobic metabolism, photosynthesis and aerobic metabolism.

Molecular Evolution: Concepts of neutral evolution, molecular divergence and molecular clocks; molecular tools in phylogeny, classification and identification; protein and nucleotide sequence analysis; origin of new genes and proteins; gene duplication and divergence.

Unit V

The Mechanisms: Population genetics – populations, gene pool, gene frequency; Hardy-Weinberg law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; adaptive radiation and modifications; isolating mechanisms; speciation; allopatricity and sympatricity; convergent evolution; sexual selection; co-evolution.

Evolution of Man: Biological and cultural evolution.

Text Books:

1. Gardner, E.J. and Snustad, D.P., 1984, Principles of Genetics, John Wiley & Sons, New York.
2. Arumugam, 2011, Essentials of Organic Evolution, Saras Publications, Nagercoil.
3. Dobzhansky, Aval,F.J., Stebbins, G.L. and Valentine, J.W., Surjeet Publications, Delhi.

Reference Books:

1. Jenkins, J.B., 1983, Human Genetics, The Benjamin Cummins Publishing Co.
2. Benjamin Lewin, 2005, Genes VIII, Oxford University Press, New York.
3. Strickberger Monroe, W., 1996, Genetics, Prentice Hall of India Pvt. Ltd.
4. John,D., Hawkins, 1996, Genes structure and expression, III Ed. Cambridge Univ. Press.
5. Strickberger, 2000, Evolution, Jones and Barlett Publishers Inc., London.
6. Mange, E.J. and Mange, A.P., 1997, Human genetics, Rastogi Publications, Meerut.

CHAIRMAN – BOS **COE**

Sl. No.: **Subject Code:** **P15ZO2C8**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – II SEMESTER – CORE COURSE - VIII

(For the candidates admitted from the year 2015-16 onwards)

DEVELOPMENTAL BIOLOGY

Unit I

Basic concepts of development: Potency, commitment, specification, induction, competence, determination and differentiation; morphogenetic gradients; cell fate and cell lineages; stem cells; genomic equivalence and the cytoplasmic determinants; imprinting; mutants and transgenics in analysis of development.

Unit II

Gametogenesis, fertilization and early development: Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals.

Unit III

Morphogenesis and organogenesis in animals: Cell aggregation and differentiation in *Dictyostelium*; axes and pattern formation in *Drosophila*, amphibia and chick; organogenesis eye lens induction, limb development and regeneration in vertebrates; Development of Extra embryonic membranes in chick, post embryonic development-larval formation, metamorphosis; environmental regulation of normal development; sex determination.

Unit IV

Placenta, Sexual cycles: Oestrous cycle, Menstrual cycle, Menopause, Pregnancy, Parturition and Hormonal control of reproductive cycles, Devlopment of foetal membranes in mammals, Birth control, Infertility, Test tube baby, Invitro fertilization, Twins, Embryo transfer and cloning

Unit V

Organiser, Nuclear transplantation, Nuclear cytoplasmic interaction, Differentiation, Regeneration

Programmed cell death, aging and senescence

Text Books:

1. Gilbert, S.F., 2003, Developmental Biology, 7th Ed., Sinamer Associates Inc., Publishers, Saunderland, Massachusettes, USA.
2. Arumugam, N., 2012, A Text book of Embryology, Saras Publications, Nagercoil.

Reference books :

1. Balinsky, B.L., 1981, An Introduction to Embryology, 5th Ed., Saunders & Co., Philadelphia.
2. Berril, N.J., 1986, Developmental Biology, Tata McGraw Hill, New Delhi.
3. Browder, L.N., 1980, Developmental Biology, Saunders & Co., Philadelphia.
4. Saunders, A.W., 1982, Developmental Biology: Pattern/Principles/ Problems MacMillan Publishing Co., New York.

CHAIRMAN – BOS **COE**

Sl. No.: **Subject Code:** **P15ZO2E2**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – II SEMESTER – ELECTIVE COURSE - II

(For the candidates admitted from the year 2015-16 onwards)

APPLIED ZOOLOGY

Unit I

Vermiculture:

Introduction to vermiculture. Types of earthworm, Biology of *Eisenia foetida*. *Eudrilus eugeniae*, Rearing of earthworms, Equipments, devices used in vermiculture, Vermicompost Technology - Methods and Products, Small Scale Earthworm farming for home gardens, Larger scale commercial composting, Vermiwash collection, composition &use, Predators and parasites and diseases of Earthworms and their control. .

Unit II

Apiculture:

Systematics, Morphology and Biology of honey bees - Honey bee species - Seasonal activities and social behaviour of honey bees - Food of the honeybees, bee flora and honey flow period - Bee keeping and ancillary industries – Newton's Beehive- Extraction of honey-Medicinal value of honey- bee products- Importance of bee colonies in crop pollination- diseases and Predators and parasites of honeybees and their control.

Unit III

Sericulture:

Origin and history of Sericulture, Moriculture-Mulberry cultivation methods, Silkworm – Taxonomy, Types, Biology and Lifecycle of *Bombyx mori*, Rearing of silkworm – Equipments, Methods, Characteristics and quality of Cocoon- Economic importance of Silk and Silk worm, Diseases and Predators and parasites of Silkworm and their control.

Unit IV

Aquaculture:

Pond construction, Types of fish culture, Cultivable freshwater fishes- Culture of carps Nursery, Rearing and stocking ponds – composite fish culture, Preparation of ponds–stocking and post stocking management, harvesting. Aquaponics. Monoculture, polyculture, composite fish culture. Diseases and Enemies of Fresh water fishes and their control. Preservation and Marketing of Fishes, MPEDA, CMFRI, CIFNET and CIBA

Unit V

Poultry Management:

Breeds of fowl, Housing and equipment, deep litter system, laying cages, Methods of brooding and rearing, debeaking. Management of growers, layers, broilers - Feed formulations for chicks, growers, phase I to phase III layers and broilers. Diseases and enemies affecting fowl. Nutritive value of egg and meat, factors affecting egg size, storage and preservation of egg, marketing, incubation and hatching of eggs. Economics of poultry production units.

Text Books:

1. Ismail, S., 2001, Vermiculture, Orient Longman Ltd., Chennai.
2. Seethalakshmi.M, and Shanthi.R., 2014,Vermitechnology, Saras Publications, Nagercoil.
3. Rare, S., 1998, Introduction to Bee Keeping, Vikas Publishing House.
4. Ganga, G. and Sulochana Chetty, J., 1997, An Introduction to Sericulture, Oxford IBH Publishing Cp. Pvt. Ltd., New Delhi.
5. Arumugam, 2002, Aquaculture, SARA Publications, Nager coil.
6. Gnanamani, M.R., 2010, Modern Aspects of Commercial Poultry Keeping, Deepam Publications, Madurai.

References:

1. Sathe Tukaram Vithatran, 2004, Vermiculture and Organic Farming,
2. NIIR Board, 2004, The Complete Technology Book on Vermiculture and Vermicompost
3. FAO, 1992, Sericulture Manual-2 (silk worm rearing), Oxford & IBH.
4. FAO, 1994, Sericulture Manual-2 (silk reeling), Oxford & IBH.
5. Sunil Kumar Das, 1994, Poultry production, CBC Publishers and Distribution, Delhi..
6. Shukula, G.S. and Upadhyay, V.B.,1997, Economic Zoology, Rakesh Rastogi Publications, Meerut.
7. Sakuntbak B.Gupta, 1976, Indian Poultry Industry year book 1975-76.By C-34,New Bactak Road, New Delhi.
8. Zade, S.B., Khune, C.J., Sitre, S.R., and Tijare, R.V., 2011, Principles of Aquaculture, Himalaya Publishing House, Mumbai.
9. Takeo Imai, 1977, Aquaculture in Shallow seas, , Oxford & IBH Publishing Co., New Delhi.
10. Gnanamani, M.R., 1991, Profitable Poultry Farming J.Hitone Publications, Madurai.
11. Bannerjee, G.C., 1992, A text Book of Animal Husbandry, Oxford & IBM Publishing Co., New Delhi.
12. Sharma, P., and Singh,L. 1987, Hand Book of Bee Keeping, Controller Printing and Stationery, Chandigarh.

CHAIRMAN – BOS **COE**

Sl. No.: **Subject Code:** **P15ZO3C9**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – III SEMESTER – CORE COURSE - IX

(For the candidates admitted from the year 2015-16 onwards)

ANIMAL PHYSIOLOGY AND BEHAVIOUR

Unit I

Blood and circulation: Blood and its components, Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, haemostasis.

Cardiovascular System: Comparative anatomy of heart structure, myogenic heart, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation.

Unit II

Digestive system (Man) : Digestion, absorption, energy balance, BMR

Respiratory system (Man): Comparison of respiration in different animals, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration in man

Excretory system (Man): Comparative physiology of excretion- kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance, Dialysis

Unit III

Nervous system (Man): Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture.

Sense organs (Man): Vision, hearing and tactile response.

Thermoregulation: Comfort zone, body temperature – physical, chemical, neural regulation, acclimatization.

Unit IV

Muscles: Structure and mechanism of Muscle Contraction - Regulation and Energetics of Contraction.

Physiology of Reproduction: Human Reproductive Physiology- Reproductive Cycles, Hormonal Control.

Endocrinology and reproduction: Endocrine glands, basic mechanism of hormone action, hormones and diseases; neuroendocrine regulation.

Unit V

Ethology: patterns of behaviour, objectives of behaviour, mechanism of behaviour- **Reflexes:** reflex action, types of reflexes, reflex arch, characteristics of reflexes and complex behaviour-

Orientation: primary and secondary orientation; kinesis – orthokinesis, klinokinesis; taxis – different kinds of taxis; sun-compass orientation, dark- light reaction.

Sexual selection: intra sexual selection (male rivalry), inter-sexual selection (female choice), infanticide, sperm competition, mate guarding, sexual selection in human, consequences of mate choice for female fitness, monogamous verses polygamous sexual conflict.

Text Books :

1. Echert R. and Randall, D., 1987, Animal Physiology, CBS Publishers and Distributors, New Delhi.
2. Mariakuttikan, A., 2011, Animal Physiology. SARAS Publication, Nagerkoil.
3. Verma, P.S., Agarwal, N.K.,Thyagi, B.S., 1980, . Animal Physiology. S.Chand & Co., New Delhi.
4. McFerland, 1986, Animal Behaviour – PsychoBiology, Ethology and Evolution, ELBS Longman.

Reference Books:

1. Hoar, W.S., 1987, General and Comparative Physiology, Prentice Hall.
2. Turner, C.D. and Bangara, J.T. (1976) General Endocrinology, W.B.Saunders Co., Philadelphia.
3. Dawson, H (1964) General Physiology, Little Brown Co; Boston.
4. Giese, A.C (1979) Cell Physiology and Biochemistry Prentice Hall.
5. Hall, J.E., 2013, Text Book of Medical Physiology, Elsevier Inc.
6. Prasad, S., 2004, Animal Behaviour, CBS Publishers and Distributors, New Delhi.

CHAIRMAN – BOS **COE**

Sl. No.: **Subject Code:** P15ZO3C10

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – III SEMESTER – CORE COURSE - X

(For the candidates admitted from the year 2015-16 onwards)

BIOMOLECULAR CHEMISTRY

UNIT- I

Structure of atoms, molecules and chemical bonds. Stabilizing interactions: Vander Waals, electrostatic, hydrogen bonding, hydrophobic interaction.

ClassificationComposition, structure and function of biomolecules: carbohydrates, lipids, aminoacids, proteins, nucleic acids and vitamins.

UNIT II

Principles of biophysical chemistry: pH, buffer, reaction kinetics, thermodynamics, colligative properties.

Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducers.

UNIT- III

Classification of Enzymes, Principle and mechanism of enzyme action, Enzyme kinetics, Enzyme regulation, Factors affecting enzyme action.

UNIT- IV

Conformation of proteins : Ramachandran plot, secondary, tertiary and quaternary structure; domains; motif and folds.

Metabolism of Nucleotides, Aminoacids and Proteins.

UNIT- V

Metabolism of carbohydrates, lipids, and vitamins.

Text Book:

l. Nelson, D.L., Leninger, A.L. and Cox, M.M.., 2008**,** Lehninger Principles of Biochemistry, W.H. Freeman Co.,

2. Ambika Shanmugam, 2003, Fundamentals of Biochemistry for Medical Students

Reference books:

1. Stryer, L., 1988, Biochemistry, W.H. Freeman & Co. New York.
2. Cooper, T.G., 1977, the Tools of Biochemistry, Wiley Interscience Publications, John Wiley & Sons, New York.
3. Murray, R.K., Granner, D.k., Mayes, P.A., Rodwell, V.W., 1988, Harper's Biochemistry, 21 ed., Appleton & Lange, Medical publications, California.
4. Bhagavan, N.V., 2004, Medical Biochemistry, 4th Ed., Academic Press (Elsevier) California

CHAIRMAN – BOS **COE**

Sl. No.: **Subject Code:** P15ZO3C11

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – III SEMESTER – CORE COURSE - XI

(For the candidates admitted from the year 2015-16 onwards)

ECOLOGY AND TOXICOLOGY

UNIT-I

The Environment: Abiotic and Biotic environment and their interactions.

Habitat Ecology and niche: Lake, Marine – Rocky, Muddy and Sandy shore, Estuary, Terrestrial, Grassland, forest and desert ecosystem Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement.

UNIT-II

Population ecology: Characteristics of a population; population growth curves; population regulation; life history strategies (*r* and *K* selection); concept of metapopulation – demes and dispersal, interdemic extinctions, age structured populations.

Species interactions: Types of interactions, interspecific competition, herbivory, carnivory, pollination, symbiosis.

Community ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones.

UNIT-III

Ecosystem: Structure and function; energy flow and mineral cycling (CNP); primary production and decomposition; structure and function of ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, eustuarine).

Ecological succession: Types; mechanisms; changes involved in succession; concept of climax.

Biogeography: Major terrestrial biomes; theory of island biogeography; biogeographical zones of India.

UNIT-IV

Applied ecology: Environmental pollution-Air, Water, Land, Thermal, Radiation and Noise; global environmental change; Biodiversity-status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches.

Conservation biology: Principles of conservation, major approaches to management, Indian case studies on conservation/management strategy (Project Tiger, Biosphere reserves).

Remote sensing and GIS – Methods and Applications in environmental management

UNIT-V

Toxicology: Environmental Toxicants and their accumulation, biotransformation and biomagnification in ecosystem, Evaluation of Toxic residues, Toxicity-Factors affecting toxicity, Bioassay - concept of LC_{50} and LD_{50}. Xenobiotics, Teratogens, Safety evaluation of toxicants.

Text Books:

1. Odum, E.P., 1966, Fundamentals of Ecology, W.B. Saunders Company.
2. Verma, P.S., Agarwal, N.K.,Thyagi, B.S., 1980, . Animal Physiology and Ecology, S.Chand & Co., New Delhi.
3. Subramaniian, M.A., 2004, Toxicology Principles and Methods, MJP Publishers,Chennai

Reference Books:

1. Clark, G.L.1954, Elements of Ecology, John Wiley & Sons. Inc. Topman Co., Ltd.
2. Kormandy, E.J., 1986, Concepts of Ecology, Prentice Hall of India Private Ltd.
3. Kumarasamy, K., Moses, A.A., and Vasanthy, M., 2007, Environmental Studies, BDU, Trichy-24.
4. Sharma, P.D., 1999, Environmental Biology and Toxicology, Rastogi Publications Meerut.
5. Sharma, B.K., 2005, Environmental Biochemistry, Krishna Prakashan Media (P) Ltd., Meerut.
6. Bhattacharya, S., 2011, Environmental Toxicology, Books and Allied Pvt. Ltd. Kolkatta.

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Sl. No.: | **Subject Code:** P15ZO3E3

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – III SEMESTER – ELECTIVE COURSE - III

(For the candidates admitted from the year 2015-16 onwards)

RESEARCH METHODOLOGY, BIOSTATISTICS AND BIOINFORMATICS

UNIT-I

Meaning of Research in Biological Sciences, Objectives, Types, Approaches, Methods of Research (Survey, Observation, case study, experimental, historical and comparative methods) - Steps in Research Process: Formulating the Research Problem, Extensive Literature Review, Developing the objectives, Preparing the Research Design including Sample Design, Collecting the Data, Analysis of Data, Generalisation and Interpretation. Preparation and Presentation of Research Report/Dissertation – Components, Tables, Figures, Formatting and Typing. Publication of Results in Journals, Proceedings, Seminars, Symposia, Conferences; Journals- Peer reviewed journals, Impact factor, Citation index.

UNIT-II

Variables in Biology, Collection, classification and tabulation of data. Frequency distribution, Diagrammatic and Graphical presentation of statistical data, Sampling techniques. Measures of Central Tendencies: Mean, Median and Mode; Measures of Deviation: Standard Deviation and Standard Error.

UNIT-III

Hypothesis Testing and estimation: Measures of Relationship: Correlation – Simple, Partial and multiple- Regression- Simple and multiple. Definitions and applications of Chi-square test, 't' and 'f' test. Meaning of analysis of variance with linear models. ANOVA-One way and two way classified data.

UNIT-IV

Genomics and Proteomics: Methods of Gene Sequencing – Shotgun Sequencing, EST Approach; Gene Prediction and Counting, Genome Similarity and SNPs, Types of Genomics - Structural, Functional - SAGE and Microarray Technology, Comparative Genomics; Human Genome Project; Proteomics - Relation between Gene and Protein; Types of Proteomics.

UNIT - V

Biological Databases – Types – NCBI, EBI, DDBJ – Literature Databases- Pubmed, Plos, Gen Bank - GenBank file format, Protein sequence Databases – SWISSPROT, PIR, Protein Structure Database - PDB.

Bioinformatic tools – BLAST, FASTA, sequence alignment – PAM, BLOSUM, MSA - clustal, PHYLIP, NJplot, Rasmol – Protein structure prediction – Chou–Fasman method and GOR method and homology modeling

Text Books:

1. Gurumani, 2006, Research Methodology, MJP Publishers, Chennai.
2. Gurumani, 2006, Biostatistics, MJP Publishers, Chennai.
3. Sundaralingam, R. and Kumaresan, V., 2012, Bioinformatics, Saras Publications, Nagercoil

References:

1. Basotia G.R. and Sharma. K.K., Research Methodology,
2. Chaudhary, C.H. Research Methodology- RBSA Publication,
3. Zar, J.H., 1984, Biostatistical Analysis, Prentice Hall, New Jersey, USA.
5. Bailey, N.T.J., Statistical Methods in Biology.
6. Sokal, R. and James, F., 1981, Introduction to Biostatistics, W.. Freeman & Co., USA.
7. RaoK.Surya, 2010, Biostatistics for Health and Life Sciences, Himalaya Publishing House Pvt. Ltd., Mumbai.
8. Virendra S. Gomase, Nandakishore T.Chikkale, 2009, Proteomics Theory and Practice, Himalaya Publishing House Pvt. Ltd, Mumbai
9. KaviKishore, Chavali, L.N., 2013, Principles of Biological Databases, Himalayas Publishing House Pvt. Ltd. Mumbai.
10. Baxevanis, A. and Ouellette, B.F.F., 2006, Bioinformatics, A Practical Guide to the Analysis of Genes and Proteins, John Wiley and Sons, New Delhi.

CHAIRMAN – BOS **COE**

Sl. No.: **Subject Code:** P15ZO4C12P

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – IV SEMESTER – CORE COURSE - XII

(For the candidates admitted from the year 2015-16 onwards)

PRACTICAL – III (CC IX, CC X ECI & EC II)
(ANIMAL PHYSIOLOGY AND BEHAVIOUR, BIOMOLECULAR CHEMISTRY, GENERAL AND APPLIED ENTOMOLOGY & APPLIED ZOOLOGY)

A. ANIMAL PHYSIOLOGY AND BEHAVIOUR

Quantitative Estimation of Amylase Activity - Oxygen Consumption in Fish – Rate of Salt Loss and Salt Gain in Fish Using Different Media.
Spotters: Haemoglobinometer, Sphygmomanometer and Kymograph

B. BIOMOLECULAR CHEMISTRY

Quantitative Estimation of Carbohydrates, Proteins and Lipids in Tissue Samples
Preparation of Solutions - Moles, Milli Moles, Micro Moles and Nano Moles.
Calculation of Molarity , Normality and Percentage
Buffer Preparation
Determination of pH Using pH Meter.
Spotters - Models of Heamoglobin and ATP

C. GENERAL AND APPLIED ENTOMOLOGY:

Collection and Classification of Insects up to order level
Mounting: Mouth Parts of Cockroach, Mosquito, Housefly.
Spotters: Rhinoceros beetle, Red cotton bug, Black headed Caterpillar, Termite, Stem borer of sugarcane, Stored grain pests – *Sitopheles* sp. and *Tribolium* sp., Lac insect, Mosquito- *Culex* sp., *Anopheles* sp., *Aedes* sp., Lady bird beetle, wasp.

D. APPLIED ZOOLOGY

Serciculture: Distinguish between male and female larvae and moth, **Spotters:** Silk worm egg, larva, pupa and adult, cocoon, silk thread,

Apiculture: Spotters: Adult queen bee, worker bee, male bee, Newton's bee hive, honey, beewax.

Vermiculture: Spotters: *Eisenia foetida*. *Eudrilus eugeniae*, vermicompost, vermiwash,

Aquaculture: Spotters: *Catla catla* (Indian carp), *Tilapia* sp., *Channa* sp. and *Clarius* sp.

Poultry Management: Rhode island red, White Leghorn, Bramma, Light Sussex, Plymouth Rock, Eggs of Desi breed and Broiler. Feeder, Waterer.

Field study: Visiting a sericulture unit/ apiculture farm/ vermiculture farm/ aquaculture farm / poultry farm.

A record of laboratory work should be submitted at the time of Practical Examination

Mark Distribution:

1.	Animal Physiology & Behaviour	: 20 Marks
2.	Biomolecular Chemistry	: 15 Marks
3.	Spotters (AP-1, BC-1, GAE-1, AZ-3)	: 24 Marks (6 x 4 = 24)
4.	Insect Box, Field study report	: 06 Marks
5.	Record	: 10 Marks
	Total	**: 75 Marks**

CHAIRMAN – BOS **COE**

Sl. No.: | **Subject Code:** P15ZO4C13P

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – IV SEMESTER – CORE COURSE - XIII

(For the candidates admitted from the year 2015-16 onwards)

PRACTICAL – IV (CC XI, EC III & EC IV)
(ECOLOGY AND TOXICOLOGY, RESEARCH METHODOLOGY-BIOSTATISTICS AND BIOINFORMATICS & BIOPHYSICAL TOOLS AND TECHNIQUES)

A. ECOLOGY AND TOXICOLOGY

1. Hydrological Studies of Water Samples with Reference to Pollution - Estimation of Chlorides, Silicates, Calcium, Total Hardness, Phosphates and Nitrates.
2. Determination of pH, DO and BOD - Quantitative Estimation of Fresh Water
3. Plankton - Mounting of any five Fresh Water Zoo-plankton' –
4. Report on Ecological Collection of Fauna representing Different Habitats (Study Tour/Field Trip may be arranged for this purpose)
5. Evaluation of Toxicity of textile/Paper mill effluent through LC_{50} 96 hr value in fishes

Spotters:
Secchi Disc, Maximum and Minimum Thermometer, Wet and Dry bulb Thermometer,
Hygrometer, Rain Guage, pH Meter, Different Species of Sandy, Muddy and Rocky Shore Fauna.

B. RESEARCH METHODOLOGY BIOSTATISTICS AND BIOINFORMATICS

Preparing a research design, Writing and arranging the references, Writing a research paper for publication.
M.S. Word: Typing, editing and formatting a document,
M.S. Excel –Drawing Bar diagram, Histogram, Line diagram and Pie chart
Problems related to Chi-square test, Student's t-test, Correlation and Regression
Spotters: Bar diagram, Histogram, Pie chart
Retrieving DNA Sequences from GenBank, NCBI; Protein Structure visualization using RASMOL

C. BIOPHYSICAL TOOLS AND TECHNIQUES

Demonstration of Beer-Lambert law using colorimeter and spectrophotometer.
Spotters: Compound Microscope, Phase contrast microscope, pH meter, UV-visible Spectrophotometer, Thermocycler, Immuno gel electrophoresis, Agarose gel electrophoresis.

A record of laboratory work should be submitted at the time of Practical Examination

Mark Distribution:

1.	Ecology and Toxicology	: 20 Marks
2.	RM BS and BI	: 10 Marks
3.	BPTT	: 10 Marks
4.	Spotters (ET-2, RMBSBI.-1 BPTT-2)	: 25 Marks (5 x 5 = 25)
5.	Record	: 10 Marks
	Total	**: 75 Marks**

CHAIRMAN – BOS **COE**

Sl. No.: **Subject Code:** **P15ZO4E4**

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

M. Sc. ZOOLOGY – IV SEMESTER – ELECTIVE COURSE - IV

(For the candidates admitted from the year 2015-16 onwards)

BIOPHYSICAL TOOLS AND TECHNIQUES

UNIT-I

Microscopy: Compound and Electron Microscope, Fluorescence microscopy, Confocal microscopy, Atomic force microscopy and live cell imaging . **Centrifugation:**
Basic principles of sedimentation, Types of centrifuges, Analytical and Preparative centrifugation, Differential and density gradient centrifugation.

UNIT–II

Chromatography: Paper chromatography, Thin layer chromatography, Ion exchange & Affinity chromatography; Gas chromatography; High pressure liquid chromatography (HPLC) **Electrophoresis :** Polyacrylamide gel electrophoresis (PAGE) – SDS, Agarose gel electrophoresis , Isoelectric focusing.

UNIT–III

Colorimetry, Spectrophotometry and Spectroscopy :
Principle instrumentation and applications of colorimetry and spectrophotometry. Spectroscopy :Flame emission spectroscopy, Atomic absorption spectroscopy, Nuclear Magnetic Resonance spectroscopy (NMR), ESR spectroscopy, Raman Spectroscopy, Mass spectroscopy.

UNIT–IV

Radioisotope Detection and Measurement: Dosimetry: Ionization chamber, GM counter, Solid and liquid scintillation counters, Autoradiography. **Assays and Analysis of Biomolecules:** Radio Immuno Assay, Enzyme Linked Immuno Sorbent Assay (ELISA), X –ray diffraction, LASER, MALDI-TOF.
Computer: MS Word, MS Excel, MS PowerPoint and Internet.

UNIT–V

Biotechnological methods: Southern, Northern and Western blotting techniques, Flow cytometry, FISH & GISH, animal tissue culture. Real time PCR, DNA microarray, DNA sequencing, Protein Microarry, Protein sequencing.
Histology and histochemistry: Fixation and sectioning of tissue, embryos and cells.

Text Books:

1. Upadhyay, A., Upadhyay, K., and Nath, N., 2004, Biophysical Chemistry, Himalayas Publishing House, Mumbai.
2. Wilson K. and John Walker, Principles and Techniques of Biochemistry and Molecular Biology, 7th Ed., Cambridge University Press, New York.
3. Subramanaiam, M.A., 2002, Biophysics. MJP Publishers, Chennai.
4. Webster, J.G., 2004, Bioinstrumentation, John Wiley & Sons, New Delhi.

Reference Books:

1. Molecular cloning A Laboratory Manual 3rd edition Vol. 1,2, 3-
2. Casey, EJ., 1962, Biophysics, Concept and Mechanism East West Press Ltd, New Delhi.
3. Daniel, M., 1989, Basic Biophysics for Biologists, Agro-Botanical Publisher, Bikaner, India.
4. Freifelder, D., 1976, Biophysical Chemistry Applications to Biochemistry and Molecular Biology, W.H. Freeman & Co., SanFrancisco.

CHAIRMAN – BOS **COE**

Sl. No.: | | **Subject Code:** P15ZO4PW

GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05

M.Sc., ZOOLOGY – SEMESTER IV – PROJECT WORK

(For the candidates admitted from 2015-16 onwards)

PROJECT WORK

SL.	Area of Work	Maximum Marks
1.	**PROJECT WORK:** **(i) Plan of the Project** **(ii) Execution of the plan / Collection of data / Organization of materials/ Fabrication Experimental study / Hypothesis, Testing etc., and Presentation of the report.** **(iii) Individual Initiative**	 **20** **45** **15**
2.	**VIVA VOCE EXAMINATION**	**20**
	TOTAL	**100**

PASSING MINIMUM – 50 MARKS

CHAIRMAN – BOS **COE**