

## **PROGRAMME SPECIFIC OUTCOME OF ZOOLOGY MAJOR**

**PSO 1: i) The main objectives of the course is to provide in depth knowledge about biodiversity of non-chordate and systematic**

**ii) Practical based on above paper.**

**PSO 2: i) Included to provide the students with recent development in the field of Biochemistry.**

**ii) Practical based Biochemistry.**

**PSO 3: i) To provide in- depth knowledge on chordates diversity and their comparative anatomy.**

**ii) Practical based on above paper.**

**PSO4: i) To knowledge on instruments use in biological field and how to apply statistics in bio logy as Bioinstrumentation and Biostatistics.**

**ii) Practical based on above paper.**

**PSO 5: i) To study of cell- Biology, Histology and Histochemistry.**

**ii) Practical based on above paper.**

**PSO 6: i) To understand the development of animals in Developmental Biology.**

**ii) Practical based on above paper**

**PSO7: i) To study the genes in Genetics and Evolution.**

**II) Practical based on above paper.**

**PSO 8: i) To provide in- depth knowledge of Animal Physiology.**

**ii) Practical based on above paper.**

**PSO: 9 i) To study of interaction with environment in Environmental Biology and Wild Life.**

**Ii) Practical based on above paper**

**PSO 10 i) To study the hormones in Endocrinology.**

**ii) Practical based on above paper.**

**PSO 11 i) To study on parasites and behaviour of animals in Parasitological and Ethologic.**

**II) Practical based on above paper.**

**PSO 12i) To study biochemistry in molecular level and immune system of body as Molecular Biology and Immunology.**

**ii) Practical based on above paper.**

**PSO 12.i) To provide recent technique and computational knowledge in Biology in Biotechnology and Bioinformatics.**

**ii) Practical based on above paper.**

**PSO 13: i) To study of economical beneficial or harmful animals in Economic Zoology**

**ii) Practical based on above paper.**

## **COURSE PUTCOME OF ZOOLOGY (MAJOR)**

### **COURSE CODE: ZOOM 101 (NON-CHORDATE & SYSTEMATICS)**

CO 1: To study of characters & classification with example of Protozoa, Porifera, Coelentera & polymorphomism, corel reef formation

CO 2: To study of characters & classification with example of Helminthes, Annelida with excretion, reproduction & importance of Pheritima, coelm & metamerism of Annelids.

CO3; i) To study of characters & classification with example of Arhtropoda, mouth parths, larval form, digestion, excretion, vision, affinities.

Co4: To study of characters & classification with example of Molluscadigetion, respiration, excretory of Pila, shell diversity, tortion & detortion Echinodermata, water vascular system in starfish, larvae.

CO 5: To study how to identify and classify animals in Systematic and classification, modern spcies concept, nomenclature, taxonomy-molecular, cyto, chemo& numerical

### **COURSE CODE: ZOOM 102 (PRACTICAL)**

CO 1: Dissection-Earthworm-urigenital system/Pila, Prawn-Nervous system Cockroach – nervous, digestive & reproductive system

CO 2: Identification- various invertebrates

CO 3: Preparation of permanent slides.

CO 4: Study of morpho-taxonomy of locally available animal.

### **COURSE CODE ZOOM 201 THEORY( BIOCHEMISTRY )**

CO 1: To study of law of thermodynamics & application, free energy, ATP & High energy phosphate, redox system, basic principle of biological chemistry-water, acid, base, ph, buffer.

CO2: Str & classi. Of carbohydrates, proteins, amino acid, lipids,

CO3: Metabolism-glycolysis, krebs cycle, ETS, ATP synthesis transcription, b-oxidation.

CO4; Enzymes-IUB classin kinetics, inhibition, vitamins, coenzymes.

CO5; DNA, RNA, Genetic materials, replication, genetic code, tr

**COURSE CODE: ZOOM 202 (PRACTICL)**

Practical based on paper 201.

**COURSE CODE: ZOOM 301 (CHORDATE DIVERSITY & COMPARATIVE)**

Co1; General character & classification proto, hemi, uro, cephalochordate, larval form, affinities

CO2: Characters etromyzontia, chondrichthyes, dipnoi, ammocoetelarva, strgills, ace, respiratory organs, swim bladder, sense organs, locomotion, migration, parental care.

CO3: Distn characters amphibia, parentalcare, metamorphosis, neoteny, Distin & characters of reptilian, sphenodon, poisonous snakes, biting mechanism.

CO4: Characters & classin of aves & mammals flight & perching mechanism, flight adaptation, dentition in mammals, eco-location, aquatic adaptation.

CO5; Comparative anatoy-fish, amphibian, reptilian, mammalian.

**COURSE CODE: ZOOM 302 (PRACTICAL)**

Practical based on paper 301

**COURSE CODE: ZOOM 303 (BIOINSTRUMENTATION & BIOSTATISTICS)**

CO1: Chromatography-paper, TLC, ion-exchange

CO2: Microscopy-light, phage-contrast, EM.

CO3: Photometry –colorimeter, spectrophotometer.

CO4: Kymography, microtomy, ultramicrotpmy, centrifugation, autoradiography.

CO5: Biostatistics- sampling, graphical representation, average, mean deviation, SD, probability, correlation & regression, significance test-t, F, X<sup>2</sup>

**COURSE CODE: ZOOM 304 (PRACTICAL)**

Practical based on paper 303.

**COURSE CODE: ZOOM 401 (CELLBIOLOGY, HISTOLOGY, HISTOCHEMISTRY)**

CO1: Pro & eukaryotic cell, mitochondria, lysosomes, ribosomes, ER, GB, nucleus, plasmamembrane matrix, receptor mediated endocytosis.

CO2; Chromosomes-poly & lampbrush, nucleosome, DNA packaging, hetero-euchromatin movements.

CO3; Cell-cycle, regulation, normal & malignant, cell division, apoptosis

CO4; Cell-signalling, second messengers, G-protein & coupled receptors.

CO5; Histological methods, classes & properties of dyes, animal's tissues.

**COURSE CODE: ZOOM 402 (PRACTICAL)**

Practical based on paper 401

**COURSE CODE: ZOOM 403 (DEVELOPMENT BIOLOGY)**

CO1: Gametogenesis & vitellogenesis.

CO2: Fertilization-type & mechanism, parthenogenesis.

CO3: Cleavage & gastrulation, cleavage pattern, blastulation & gastrulation in chick, germ layers, primary organizers, induction, properties, mechanism. Organogenesis-eye & ear

CO5: Extra-embryonic membranes in birds, placentation.

**COURSE CODE: ZOOM 404 (PRACTICAL)**

Practical based on paper 403

**COURSE CODE: ZOOM 201 (GENETICS & EVOLUTION)**

CO1: Mendel's laws its analysis, gene, allele, incomplete, factors, epistasis, lethal.

CO2: Linkage & crossing over, gene mapping, sex determination, sex-linked inheritance, cytoplasmic inheritance.

CO3: Fine structure of gene, mutation in details, human genetics, inborn metabolism, human chromosome, HGP.

CO4: Evolution-evidences, Lamarckism, Darwinism, modern synthesis theory, origin of life, variation, isolation, speciation, fossil & fossil formation.

CO5: Population –gene pool, gene frequency, endemism, adaptive radiation.

**COURSE CODE: ZOOM 502 (PRACTICAL)**

Practical based on paper 401.

**COURSE CODE: ZOOM 503 (ANIMAL PHYSIOLOGY)**

CO1: Muscle contraction- myofilaments, sarcoplasmic reticulum, T-tubules, contraction.

CO2: Digestion & absorption –secretion, regulation, gastro-intestinal hormones, balance-diet.

CO3: Excretion-structure & function of nephron, mechanism & regulation urine formation, dialysis,

CO4; Circulation , cardiac cycle, disordes of cardio-vascular system, haemostasis, respiration- haemoglobin, transports, regulation, co2 poisoning, tracheal respiration in insects.

CO5; Nervous system-RMP, action potential, propagation, synopsis & transmission, nerutransmitters, nerumuscular junction, reflex, vision, drugstypes, addiction, effects, social implication.

**COURSE CODE: ZOOM 504 (PRACTICAL)**

Practical based on paper 503.

**COURSE CODE: ZOOM 505 (ENVIRONMENTAL BIOLOGY & WILDLIFE)**

CO1: Ecosystem, species, communities, biome, biotic abiotic factors, energy flow.

CO2: Shelford's law, liebig's; aws, productivities, population, dynemics, r&k strategy, lotka-volterra model, natality, mortality, predator & prey relationship.

CO3: Biogeochemical cycle renewable & non-renewable resources of NE, Remote sensing, EIA.

CO4: Pollution-water, air, soil, bioindicators, succession, ecological backlash, GHE, ozone layer depletion.

CO5: ICUN species category, endangered species of NE, threats to biodiversity, man-wildlife conflict, ex & in situ conservation, national park of NE, biosphere reserve, biodiversity hotspot, Indian Wildlife protection act 1972.

**COURSE CODE: ZOOM 504 (PRACTICAL)**

Practical based on paper 503.

**COURSE CODE: ZOOM 505 (ENDOCRINOLOGY)**

CO1: Comparative anatomy of pituitary thyroid, adrenal, pancreas of fish, amphibian, birds, mammals

CO2; Hormones secreted by endocrine gland & their function.

CO3: Characters of hormones, mechanism of action, regulation, disorders with hypo-hyper secretion.

CO4: Roles in reproductive cycle, pregnancy, lactation, method of contraception, amniocentesis, IVF.

Co5: Neuroendocrine system in insects role of hormones in growth & development of insect.

**COURSE CODE: ZOOM 506 (PRACTICAL)**

Practical based on paper 505.

**COURSE CODE: ZOOM 601 (PARASITOLOGY & ETHOLOGY)**

CO1: Parasitism-types of parasites, host, vectors, adaptation life cycle of entamoeba, trypanosome, leishmania, giardia, trichomonas, plasmodium.

CO2: Pathogenesity of bacteria, viruses, rickettsia, borrelia, leptospira, life history of, parasitic adaptation & pathogenicity of taenia solium, fasciola, ancylostoma, wuchereria.

CO3: Animal behaviour- history, pattern, sense organs, genetical ecological aspects of behaviour.

CO4; Orientation, communication, learning, offensive & defensive behaviour, insect behaviour.

### **COURSE CODE: ZOOM 602 (PRACTICAL)**

Practical based on paper 601

### **COURSE CODE: ZOOM 603 (MOLECULAR BIOLOGY & IMMUNOLOGY)**

Co1: Genome organization in pro & eukaryotes, DNA, RNA, DNA as genetic materials, forms of DNA.

Co2: Replication & transcription, genetic code, wobble hypothesis, protein biosynthesis in prokaryotes.

CO3: Recombination in prokaryotes; transformation, conjugation & transduction, concept of transposons & plasmids, regulation of gene expression in prokaryotes, operon concept ( Lac operon)

CO4; Types of immunity, cell, organ, lymphoid organ, antigens, properties, adjuvant & haptens, antigen-antibody reaction, vaccines, vaccinations

CO5; Immunoglobulin; str, classes, function, clonal, poly, monoclonal antibodies, major histocompatibility complex, str 7 functions immune system in health & disease, immunodiagnostic technique (immunodiffusion, RIA, ELISA, AID).

### **COURSE CODE: ZOOM 604 (BIOTECHNOLOGY & BIOINFORMATICS)**

CO1; Genetic engineering protoplast fusion & somatic hybridization technique, recombinant DNA technology & application in agriculture, health, industrial biotechnology, production of alcohol & antibiotics.

CO2; Omics, str & function genomics, DNA sequencing, HGP, proteomics, transcriptomics.

CO3; Regulation of biotechnology, production & application of transgenic animals & plants, GMO, IPR, patent & ethical issues.

CO4; Bioinformatics-history & scope, sources of information-internet, www, web browsers, biological database, -NCBI, gene bank, SWISS PROT, ENTREZ.

CO5; Database search & sequence alignment & tools- FASTA & BLAST, methods of sequence alignment, phylogenetic analysis, evolutionary phylogeneny & constructing phylogenetic trees

**COURSE CODE: ZOOM 605 (PRACTICAL)**

Practical based on paper 603 & 604.

**COURSE CODE: ZOOM 603 (ECONOMIC ZOOLOGY)**

CO1: Major insect pest of paddy, tea, stored grain & their biology, pest management-biology, chemical, culture, IPM.

CO2: Life history of silkworm-eri, muga, mulberry, culture technique of silkworm, disease & prevention.

CO3: Life history of honey bee, rearing, culture, biology & culture of lac insect.

CO4: Principle & practice of aquaculture, fish, prawn, prepn, manag of different types of pond, iduce breeding, hybridization technique in fishes, fish preservation, fish by-product.

CO5: Piggery management & practices of pig rearing, poultry, selection breed –chicken & duck & their scientific rearing methods, poultry diseases& its preservation.