

Shri Swami Vivekanand Shikshan Sanstha's
VIVEKANAND COLLEGE, KOLHAPUR
(An Empowered Autonomous Institute)
(Affiliated to Shivaji University, Kolhapur)
NAAC Reaccredited: "A" with CGPA 3.29

SYLLABUS FOR
M.Sc. ZOOLOGY ENTRANCE EXAMINATION
ACADEMIC YEAR 2025-2026

1. ANIMAL DIVERSITY

General characters and classification up to classes /order with suitable examples: Protista, Protozoa, Porifera, Cnidaria, Platyhelminthes, Nematelminthes, Annelida, Arthropoda, Mollusca, Echinodermata, Hemichordata, Protochordata, Agnatha, Pisces, Amphibia, Reptiles, Aves, Mammals.

2. CELL BIOLOGY AND GENETICS

Structure of prokaryotic and eukaryotic cells, structure of nucleus, nuclear membrane, nucleoplasm, chromatin and nucleolus, structure of chromosome, euchromatin and heterochromatin, morphology and organization (nucleosome), polytene and lampbrush chromosomes. Ultra structure and functions of plasma membrane, mitochondria endoplasmic reticulum, Golgi complex lysosome, peroxisome, cell cycle and division: cytoskeleton. Mendel's work on transmission of traits, genetic variations, Mendelian and post Mendelian genetics, principles of inheritance, incomplete dominance and co-dominance, gene interaction, multiple alleles w.r.t. ABO, Rh blood groups and coat colour in rabbit, sex linked inheritance. Linkage, coupling and repulsion theory, crossing over, chromosomal mutations, sex determination, normal human karyotype, genetic disorders:

3. PRINCIPLES OF BIOCHEMISTRY

Carbohydrate metabolism structure, classification and function of carbohydrate, glycolysis, Krebs cycle, electron transport chain, pentose phosphate pathway, gluconeogenesis, glycogenolysis, lipid metabolism structure, classification, properties, types and functions of lipids, biosynthesis of fatty acids and cholesterol, β oxidation of palmitic acid. Protein metabolism, amino acids- structure, essential and non-essential amino acids, protein structure, transamination, deamination and urea cycle, enzymes- definition, properties, nomenclature and classification of enzymes, mechanism of action of enzymes, factors affecting enzyme activity, inhibition and regulation of enzyme action.

4. ETHOLOGY AND EVOLUTION

Animal psychology, classification of behavioral patterns, Analysis of behaviour, Innate behaviour, **Communication:** Chemical, visual, audio, olfactory, electric, touch; Species specificity of songs; Communication in bees and ants.

Ecological Aspects of Behaviour:

Habitat selection, food selection, optimal forage theory, anti-predation defenses, aggression, homing, territoriality

Social Behaviour:

Aggression, aggregations, group selection, kin selection, social organization in insects and primates

Reproductive Behaviour:

Mating systems, courtship, sexual selection

Biological rhythms: Circadian and circa-annual rhythms, orientations and navigation, migration of fishes and birds

Life's beginnings: Chemogeny, RNA World, Biogeny, the origin of photosynthesis, evolution of eukaryotes, geological time Scale

Evolutionary theories

Lamarckism, Weismann's theory of germplasm, Darwinism, Mutation theory, Neo-Darwinism

Processes of Evolutionary Change

Natural selection, types of natural selection, artificial selection, adaptive radiation, evidences of evolution, species concept, and mass extinction

5. APPLIED ZOOLOGY

Apiculture –types and casts of honey bee, honey comb, bee keeping a. Bee hive – newton and Langstroth models, beekeeping equipment, extraction of honey, medicinal value of honey, animal husbandry indigenous and exotic breeds of cattle, preservation and artificial insemination in cattle, type of shelters, pearl culture-species of oyster, process of pearl formation, maintenance of oysters, harvesting, importance of pearl, freshwater prawn culture-species of prawn, site selection, farm construction, fertilization, larval development, food and feeding, harvesting, fish technology, induced breeding, transportation of fish seed, feeding and development, harvesting and marketing, goat farming- types of breeds, feeding, housing, economic importance

6. MAMMALIAN PHYSIOLOGY AND ENDOCRINOLOGY

Introduction to the digestive system digestion and absorption of carbohydrates, proteins, lipids, respiration-mechanism of ventilation, respiratory pigment, exchange of gases and transport of oxygen and carbon dioxide in blood, cardiovascular system: composition of blood, structure of heart, origin and conduction of the cardiac impulse, cardiac cycle, types of muscles, ultra-structure of skeletal muscle fibre, mechanism of muscle contraction, structure of neuron, origin and conduction of nerve impulse in non-myelinated neurons, types of synapse and synaptic transmission. Excretion: structure of kidney and nephron, mechanism of urine formation, counter current mechanism, endocrine glands- pituitary gland, thyroid gland, parathyroid gland, adrenal gland, and islets of Langerhans.

7. AQUATIC BIOLOGY, ECOLOGY TOXICOLOGY

Aquatic biomes- lakes, wetlands, streams and rivers, estuaries intertidal zones, oceanic pelagic zone, marine benthic zone, coral reefs, freshwater biology, lakes a. Lake as an ecosystem, lake morphometry, physicochemical characteristics, light, temperature, thermal stratification, dissolved solids, carbonates vi. bicarbonates, phosphates and nitrates, turbidity, dissolved gases, Nutrient cycle – nitrogen, sulphur and phosphorus, streams, adaptation of hill stream fishes, study of faunal adaptations w.r.t. habitat lentic, lotic estuarine, intertidal zones, deep sea. Freshwater pollution- causes of pollution, eutrophication and management

Ecology

The structure, function, types ecosystem, abiotic and biotic components, niche width and overlap, fundamental & realised niche. Food chain, food web and ecological pyramids, species interactions-types of interaction. Community ecology: nature of communities, characteristics, ecotone and edge effect, ecological succession -types of succession, stages of succession, mechanisms of succession, types of seres, ecological adaptation in aquatic, desert & terrestrial animals

Toxicology

Dose-effect and dose-response relationship- acute toxicity, sub-acute toxicity, chronic toxicity, organ specific toxicity (neurotoxicity, hepatotoxicity, nephrotoxicity) Heavy metal toxicity- mercury, lead, cadmium. Classification of toxic agents- natural toxins, animal toxins, plant toxins, food toxins, and chemical toxins.

8. COMPARATIVE ANATOMY OF VERTEBRATES

Integumentary system, soft and hard epidermal derivatives, skeletal system, digestive system, respiratory system, gills, lungs, air sacs, circulatory system, evolution of heart and aortic arches, evolution of kidney, nervous system, sense organs.

9. MOLECULAR CELL BIOLOGY AND BIOTECHNOLOGY

Nucleic acids- structure and types of DNA. RNA, DNA replications, DNA damage and repair mechanism, regulation of gene expression, genetic code, wobble hypothesis, RNA synthesis, protein synthesis, restriction enzymes: cloning vectors- plasmids, cosmids, phagemids, lambda bacteriophages, gene cloning: transformation techniques- construction of genomic and cDNA libraries, southern, northern and western blotting, DNA sequencing, PCR, DNA finger printing

10. BIOTECHNIQUES AND BIOSTATISTICS

Production of cloned and transgenic animals: nuclear transplantation, retroviral method, dna microinjection, applications of transgenic animals in productions of pharmaceuticals, production of donor organs, gene knockout in mice. Cell culture technique- cell culture growth media, sterilization techniques, primary cell culture method, cell lines, potency of stem cells: totipotency, pluripotency, multipotency, unipotency applications of stem cells in medicine, cryopreservation technique. Biostatistics- biological data, classification of biological data, frequency distribution, tabulation, graphical representation of data, measures of central tendency – mean, median, mode. Dispersion - mean deviation and standard deviation. Correlation –scattered diagram, Karl pearson's correlation coefficient, Spearman's rank correlation coefficient.

11. REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY

Functional anatomy of male and female reproductive system. Diagnostic features of pregnancy and hormonal regulation, mechanism and hormonal regulation of parturition and lactation. Hormonal control of reproduction and implantation, mechanism and hormonal regulation of parturition and lactation. Infertility in male and female: causes, diagnosis and management. IVF, contraceptives and assisted reproductive technology

Fertilization and early development- structure of gametes and types of eggs, fertilization, types of cleavages, types of morphogenic movements, organizer and induction, fate of three germ layers

Early Development of Frog- structure of mature egg and its membranes, cleavage, blastula and its fate map, process of gastrulation, neurulation, metamorphosis in frog and its hormonal regulation

Chick Embryology-structure of sperm, structure of egg and vitellogenesis, fertilization and cleavage, blastula and fate map, gastrulation, organogenesis, neural tube formation. Development chick up to 72 hours of incubation, foetal membranes and significance.

Implantation and placentation- implantation and placentation of embryo in human, types of and significance

12. IMMUNOLOGY

Immune system, basic concepts in immunology, components of the immune system, principles of innate and adaptive immune system. Cells and organs of the immune system, haematopoiesis, lymphoid organs, immune responses- humoral and cell-mediated. Antigens, basic properties of antigens, types of antigens,

pathways of antigen processing and presentation, epitopes, haptens and adjuvants. Antibodies, structure, classes, and functions of antibodies, polyclonal antibodies, monoclonal antibodies, antigen – antibody interactions. Types, structure, and functions of MHC, cytokines, complement system: components and pathways, allergy, hypersensitivity, and autoimmunity, immune disorders, vaccines
