(PO)

4 Years Bachelor of Science B.Sc. (Hons.) in Zoology under

CBCS POS (Major Courses)

S.No	UG Semester	Course	POS
1.	I	MJC-1 Diversity of Non-Chordata	i) Introduction to Non-chordates ii) a. Protozoa b. Porifera iii) a. Cnidaria b. Ctenophora c. Platyhelminthes and Nemathelminths iv) a. Annelida: Earthworm, Leech b. Arthropoda: Peripatus, Adaptive variations in insect mouth parts c. Mollusca: Structure and Life cycle: Unio, Pila. Torsion and Detorsion in Gastropod d. Echinodermata
2.	II	MJC-2 Diversity of Chordates	i) Introduction to Chordates. ii) a. Origin and Evolution of Chordata. b. Cephalochordate: Amphioxus. c. Urochordata: Herd mania (including retrogressive metamorphosis) d. Cyclostomatous: Petromyzon. iii) a. Pisces: Migration, Osmoregulation, and accessory respiration. b. Amphibia: Origin and Evolution: Parental care, Neoteny. C. Reptilia iv) a. Aves: Origin of birds; Flight adaptations, Migration in birds. b. Mammals: Characters, distribution and affinities of Prototheria Metatheria, Eutheria.
3.	III	MJC-3 Comparative Anatomy	i) Integumentary System ii) Skeletal System iii) Digestive System iv) Respiratory System v) Circulatory System a. General plan of circulation. b. Evolution of heart and aortic arches. vi) Urinogenital System vii) Nervous System
4	III	MJC-4 Physiology	i) Digestive System: a. Digestion, Absorption and Assimilation of Carbohydrates, Protein and Lipid. b. Digestive glands. ii) Neuromuscular Physiology a. Structure of neuron, Propagation of nerve impulse. b. Structure of skeletal unacle, Mechanism of muscle contraction c. Neuromuscular junction. iii) Respiratory Physiology: a. Ventilation and Internal Respiration. b. Respiratory pigments. c. Transport of gases in blood. iv) Cardiovascular System: a. Components of blood and their function, blood coagulation. b. Coronary circulation and heart beat. c. Cardiac cycle and ECG. d. Nervous and chemical regulation of heart rate. v) Renal and Reproductive Physiology: a. Structure of nephron and renal blood supply. b. Mechanism of urine formation and its regulation. c. Acid-Base balance. d. Spermatogenesis and oogenesis. e. Menstrual cycle.
5.	IV	MJC-5 Cell Biology	i) Overview of Virus, Prokaryotic and Eukaryotic cells.

			ii) Plasma Membrane: a. Various models of plasma membrane. b. Transport across membranes (passive and active transport) iii) Cytoplasmic organelles a. Endoplasmic Reticulum-Structure, Signal hypothesis, b. Golgi apparatus-Structure, Protein sorting 3.3 Lysosomes and Peroxisomes. c. Mitochondria-Structure, Respiratory chain and oxidative phosphorylation. iv) Nucleus: a. Structure of Nucleus. b. Euchromatin and Heterochromatin. v) Cell Division a. Cell cycle and Molecular basis of its regulation. b. Mitosis and Meiosis
6	IV	MJC-6 Endocrinology	i) Introduction to Endocrinology a. Overview of the endocrine system. b. Classification of hormones and their synthesis. ii) Hypothalamus - hypophysial system a. Structure of hypothalamus and its role in neuroendocrine regulation. b. Structure of pituitary gland, its hormones and function. c. Hormonal dysfunction associated with pituitary gland. iii) Peripheral Endocrine Glands a. Functional histology, hormoncs and function of Thysuid, Parathyroid, Adrenal, Islets of Langerhans and Gonads. b. Disorders related to hypersecretion and hyposecretion iv) Molecular Endocrinology a. Hormone receptors. b. Mechanism of hormone action (Steroid and Non-steroid). c. Regulation of hormone action
7.	IV	MJC-7 Ecology	i) Components of Ecology a. Biotic factors. b. Abiotic factors. c. Laws of limiting factors. ii) Ecosystem a. Definition, structure, and function of different types of ecosystems including wetland ecosystem. b. Food chain and Food web. c. Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies. d. Biogeochemical cycles. iii) Population ecology a. Study of population attributes (Natality, Mortality, Density). b. Life tables; Exponential and logistic growth, equation and patterns, r and k strategies. c. Population interactions; Lotka-Volterra model. iv) Community Ecology a. Community characteristics: species richness, dominance, diversity, abundance, Ecotone and Edge effect. b. Ecological succession with examples and types v) Applied Ecology a. Biodiversity-Importance and threats. b. Wildlife conservation and management, National Parks, Bioreserves and Sanctuaries. c. Pollution and its hazards.
8.	V	MJC-8 Biochemistry	i) Elementary idea of biomolecule a. Structure and classification of Carbohydrates, Lipid and Protein. b. Structure, classification and physiological importance of Amino Acids. c. Structure, classification and physiological importance of vitamins ii) Enzymes a. Nomenclature and classification, Isozymes b. Kinetics of enzyme-substrate reaction c. Regulation of enzyme action

			iii) Carbohydrate Metabolism a. Glycolysis and Critic acid cycle b. Pentose Phosphate Pathway, Gluconeogenesis, Glycogenolysis and glycogenesis. iv) Lipid and protein Metabolism 4.1 Beta oxidation and omega-oxidation of fatty acids, Ketogenesis 4.2 Transamination, Deamination, Urea cycle
9.	V	MJC-9 Genetics	i) Mendelian Genetics and Linkage 1.1 Principles of inheritance, Incomplete dominance and co dominance, Multiple alleles, Lethal alleles, Epistasis and Pleiotropy 1.2 Linkage and crossing over, its cytological basis and molecular mechanisms, Recombination frequency, Interference and coincidence. ii) Mutations 2.1 Gene mutation Chemical and Physical mutagenesis. 2.2 Chromosomal aberrations Structural and Numerical. 2.3 Detection of mutations in Drosophila - CLB method and attached X method. iii) Sex Determination 3.1 Chromosomal mechanisms of sex determination. 3.2 Genetic and molecular basis of sex determination in Drosophila. 3.3 Sex-linked inheritance, sex-influenced and sex-limited characters. iv) Extra-chromosomal Inheritance and Quantitative Genetics 4.1 Criteria for extra-chromosomal inheritance. 4.2 Antibiotic resistance in Chlamydomonas, Kappa particles in Paramecium and Maternal effects (Shell spiraling in snail) 4.3 Polygenic inheritance.
10.	VI	MJC-10 Developmental Biology	i) Introduction 1.1 Principles and Basic concepts of development biology - Phases of development, Cell-Cell interaction, Differentiation and growth 1.2 Gametogenesis : Spermatogenesis and Oogenesis. 1.3 Mechanism of fertilization, Types of eggs and cleavage, Blastulation, Fate maps (including Techniques). ii) Early and Late Embryonic Development 2.1 Early development of frog and chick up to gastrulation 2.2 Late Embryonic Development: Fate of Germ Layers, Extra-embryonic membranes in birds, Placentation iii) Post Embryonic Development 3.1 Metamorphosis: Changes, hormonal regulations in amphibians. 3.2 Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each). iv) Implications of Developmental Biology 4.1 Teratogenesis: Teratogenic agents and their effects on embryonic development. 4.2 In vitro fertilization, Stem cell, Amniocentesis. 4.3 Basic concept of Aging and senescence.
11.	VI	MJC-11 Evolution	i) Origin of Life 1.1 Chemogenic and RNA World. 1.2 Evolution of Eukaryotes. ii) Evolutionary concepts 2.1 Lamarckism, Darwinism and Neo-Darwinism. 2.2 Types and causes of Variation and their role in evolution. iii) Evidences of Evolution 3.1 Evidences of Organic Evolution. 3.2 Types of fossils and geological time scale. 3.3 Evolution of horse and

			man. 3.4 Human migration-Theories, Mitochondrial DNA and Y-chromosome studies. iv) Population Genedes: 4.1 Hardy-weinberg Law, gene pool and allele frequency. 4.2 Natural selection (concept of fitness, types of selection, kin selection). 4.3 Genetic Drift (mechanism, founder's effect, bottleneck phenomenon).
12.	VI	MJC-12 Animal Behaviour	i) Introduction to Animal Behaviour 1.1 Definition of behaviour. 1.2 Brief profile of modern ethologists (Karl von Frisch, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen). 1.3 Proximate and ultimate causes of behaviour. ii) Patterns of behaviour and its Control 2.1 Stereotyped Behaviour, Orientation and Reflex 2.2 Innate and Learned behaviours iii) Biological Rhythm 3.1 Biological clocks in animals, Adaptive significance of biological clocks 3.2 Types of biological rhythms- Tidal, Lunar, Circadian and Circannual 3.3 Role of melatonin iv) Social and Sexual Behaviour: 4.1 Social behaviour of insects (Honey bee), Foraging and dances in honey bee. 4.2 Parental care in fishes and amphibians.
13.	VII	MJC-13 Molecular Biology	i) Basics of Nucleic Acid: 1.1 Central Dogma of Molecular Biology. 1.2 Structure of DNA, DNA forms, Repetitive DNA. 1.3 Structure and functions of mRNA, RNA, and rRNA ii) DNA replication and repair 2.1 DNA replication in prokaryotes. 2.2 DNA repair, mismatch repair, Base excision repair (BER), Nucleotide excision repair (NER) . 2.3 Difference between prokaryotic and eukaryotic replication (A brief account) iii) Transcription: 3.1 Mechanism of transcription in prokaryotes. 3.2 Difference between prokaryotic and eukaryotic transcription (A brief account). iv) Translation: 4.1 Genetic code, degeneracy of genetic code and Wobble hypothesis. 4.2 Structure of ribosomes. 4.3 Mechanism of translation in prokaryotes. 4.4 Difference between prokaryotes and eukaryotes translation (A brief account).
14.	VII	MJC-14 Research Methodology	
15.	VII	MJC-15 Immunology and Microbiology	i) Basic Concept of immunity 1.1 Overview of Immune System, Cells and organs of Immune system. 1.2 Innate and Adaptive Immunity - Anatomical barriers, Inflammation and Phagocytosis, Mechanism of cell and humoral mediated immunity, Active and Passive immunity. ii) Antigen and Immunoglobulin: 2.1 Antigens; Antigenicity vs immunogenicity, Factors influencing immunogenicity, Adjuvants and haptens. 2.2 Immunoglobulins: Structure and functions of different classes of immunoglobulins, Antigen-antibody interactions iii) MHC and Cytokines 3.1 Major Histocompatibility Complex: Structure and functions of MHC 1 and II, Antigen processing and presentation. 3.2

			Cytokines-Types and function. iv) Complement system and Vaccines 4.1 Complement System: Components and pathways of complement activation. 4. 2 Vaccines: Various types of vaccines. v) Microbiology 5.1 Bacteria; Structure, Classification, Growth, Culture and Pathogenicity. 5.2 Virus; Morphology and Pathogenicity. 5.3 A brief outline of endoparasites diseases.
16.	VIII	MJC-16 Instrumentation and Biometry	i) Instrumentation 1.1 Principle and uses of: pH meter, Colorimeter, Spectrophotometer, Centrifuge. 1.2 Microscopy: Light microscope, Compound microscope, Phase contrast, Fluorescent and Electron Microscope. ii) Biological Techniques 2.1 Electrophoresis Agarose gel, SDS-PAGE electrophoresis. 2.2 Chromatography - Column, GLC 2.3 Cell separation by density gradient centrifugation. 2.4 Introduction to different culture medium and tools used. 2.5 PCR 2.6 Recombinant DNA Technology iii) Introduction to Biometry 3.1 Concept of data and graphical presentation of data. 3.2 Measures of central tendency: mean, mode and median. 3.3 Measures of dispersion, standard deviation, standard error. 3.4 lypes of variables, Poisson, Binomial and Normal distribution. 3.5 Experimental design and hypothesis testing. iv) Tests of Significance 4.1 Test of significance: t-test, F-test, chi square test 4.2 Multiple linear regression - ANOVA (One way and two-way ANOVA). 4.3 Correlation and simple linear regression 4.4 Karl-Pearson correlation coefficient and Ranks correlation Coefficient