



## MSC in Zoology

### 1<sup>st</sup> Semester

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
MSCZO 101	BIOSYSTEMATICS AND TAXONOMY	40	60	100
MSCZO 102	STRUCTURE & FUNCTION OF INVERTEBRATES	40	60	100
MSCZO 103	MOLECULAR BIOLOGY & BIOTECHNOLOGY	40	60	100
MSCZO 104	Zoology Practical	60	40	100
<b>Total</b>		<b>180</b>	<b>220</b>	<b>400</b>

### 2<sup>nd</sup> Semester

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
MSCZO 201	GENERAL PHYSIOLOGY	40	60	100
MSCZO 202	BIOCHEMISTRY	40	60	100
MSCZO 203	BIOSTATISTICS AND POPULATION GENETICS	40	60	100
MSCZO 204	Zoology Practical	60	40	100
<b>Total</b>		<b>180</b>	<b>220</b>	<b>400</b>

### 3<sup>rd</sup> Semester

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
MSCZO 301	BIOLOGY OF CHORDATES	40	60	100
MSCZO 302	ENVIRONMENTAL BIOLOGY AND ETHOLOGY	40	60	100
MSCZO 303	GENES AND DIFFERENTIATION	40	60	100
MSCZO 304	Zoology Practical	60	40	100
<b>Total</b>		<b>180</b>	<b>220</b>	<b>400</b>

### 4<sup>th</sup> Semester

PAPERS CODE	PAPERS NAME	INTERNAL	EXTERNAL	TOTAL
MSCZO 401	TOOLS & TECHNIQUES	40	60	100
MSCZO 402	ENTOMOLOGY: INSECT PHYSIOLOGY,	40	60	100
MSCZO 403	INSECT SYSTEMATIC, ECOLOGY and Applied Entomology	40	60	100
MSCZO 404	Zoology Practical	60	40	100
<b>Total</b>		<b>180</b>	<b>220</b>	<b>400</b>

## M.Sc. Zoology (I) year Syllabus

### 1MSZO01 : BIOSYSTEMATICS AND TAXONOMY

#### UNIT-I

1. Definition and basic concepts of biosystematics and taxonomy. History of taxonomy.
2. Importance and applications of biosystematics in biology.
3. Definition and understanding of various taxonomic categories.
4. Species concepts and species categories – subspecies and infraspecies.

#### UNIT-II

- Modern trends in taxonomy- 5. Chemotaxonomy 6. Cytotaxonomy 7. Molecular taxonomy 8. Neotaxonomy 9. Determination of phylogenetic relationships using computer programs.

#### UNIT-III

10. Taxonomic procedures; collection, preservation, curation and process of identification. 11. Taxonomic characters of different kinds. Quantitative and

Qualitative analysis of variation. 12. Process of typification, different zoological types and their significance. 13. Theories of biological classification.

#### UNIT-IV

14. Different kinds of systematic Publications. 15. Taxonomic Keys: their kinds, merits and demerits. Use of taxonomic keys. 16. International Code of Zoological Nomenclature (ICZN) 17. Interpretation and application of important rules and formation of scientific names of different taxa.

### 1MSZO02: STRUCTURE & FUNCTION OF INVERTEBRATES

#### UNIT I

1. Body organization: 1.1 Origin of life, Uni and multi cellular organisms 1.2 Body cavity: Acoelome, Pseudocoelome, Coelome (schizo and enterocoelous) 1.3 Fate of Blastopore : Protostome, Deuterostome 1.4 Type of Blastomeres : Determinate and Indeterminate blastomeres 1.5 Type of cleavage : Spiral and Radial 1.6 Type of symmetry : Body planes, Asymmetry, Radial, biradial, bilateral symmetry 1.7 Segmentation : Pseudo, superficial and metameric 2. Locomotion: 2.1 Flagella and ciliary movement in Protozoa. 2.2 Hydrostatic movement in Coelenterata, Annelida and Echinodermata.

#### UNIT II

3. Nutrition and Digestion: 3.1 Strategies of feeding in invertebrates and digestion in lower Metazoa. 3.2 Feeding in Polycheta, Mollusca and Echinodermata. 4. Respiration: 4.1 Organs of respiration in invertebrates - Gills, book lungs and trachea. 4.2 Mechanism of respiration 5. Excretion: 5.1 Organs

of excretion in invertebrates specially Coelomoducts, Nephridia and Malphigiantubules,organofbojanus,greengland 5.2Mechanisms ofexcretion.

#### UNITIII

6. Nervous System : 6.1 Primitive nervous system Coelenterata andEchinodermata.6.2AdvancedNervoussystemAnnelida,Arthropoda(Crustacea and insecta) and Mollusca (Cephalopoda) 7. Reproduction: 7.1Regeneration, Asexual ( paramecium, obelia) and sexual reproduction (annelida,arthropodaand mollusca)

#### UNITIV

8. Important systems: 8.1 Canal system in sponges 8.2 Parasitic helminthes 8.3Proto,meso and meta nephridia 8.4 Respiration in unio and pila 8.4 Watervascular system in star fish 9. Minor Phyla : Organization and

generalcharacters 9.1 Tardigrada , Entoprocta , Ctenophora , Rhynchocoela,Sipunculida, Rotifera,Gastrotricha

1MSZO3: : MOLECULAR BIOLOGY & BIOTECHNOLOGY

#### UNITI

1. DNA replication 1.1 Prokaryotic and eukaryotic DNA replication. 1.2Mechanics of DNA replication. 1.3 Enzymes and accessory proteins involved inDNA replication. 2. Recombination and repair 2.1 Holiday junction. 2.2FLP/FRT and Cre-Lox recombination. 2.3 Rec A and other recombinases. 2.4DNArepair mechanisms.

#### UNITII

3 Transcription 3.1 Prokaryotic transcription. 3.2 Eukaryotic transcription. 3.3Regulatory elements and mechanisms of transcription regulation. 3.4Transcription termination – attenuation and antitermination. 3.5 Gene silencing.4 Post-transcriptional modifications in RNA 4.1 5'- Cap formation. 4.2 Endprocessing and polyadenylation. 4.3 Splicing and editing. 4.4 Nuclear export ofmRNA.4.5RNastability.

#### UNITIII

5 Translation 5.1 Genetic code 5.2 Prokaryotic and eukaryotic translation 5.3Regulation of translation 5.4 Co-and post-translation modifications of proteins.6 Protein sorting Organelle biogenesis and protein synthesis. 6.1 Synthesis andtargeting of mitochondrial and choloroplast proteins 6.2 Synthesis and targetingof peroxisomal proteins 6.3 Secretory pathways 6.4 Translocation of secretoryproteins across the ER membrane 6.5 Insertion of membrane proteins in the ERmembrane 6.6 Post-translation modifications in rER. 6.7 Protein glycosylationin ER and Golgi complex 6.8 Golgi and post-Golgi protein sorting andproteolytic processing 6.9 Receptors-mediated endocytosis

and sorting ofinternalizedproteins6.10Molecular mechanismsof vesicular traffic.

#### UNITIV

7 Molecular mapping of genome 7.1 Genetic and physical maps 7.2 Southernhybridization,fluorescenceinsituhybridization(FISH)forgenomeanal ysis.

7.3 Molecular markers in genome analysis( RFLP, RAPD and AFLP )  
7.4 Application of RFLP in forensic, disease prognosis, genetic counseling and pedigree analysis. 8 Transgenic animals and knock-outs 8.1 Production  
8.2 Applications 8.3 Embryonic stem cells 8.4 Bioethics 9 Assisted reproduction technologies 9.1 Embryo sexing and cloning. 9.2 Screening for genetic disorders. 9.3 ICSI, GIFT etc. 9.4 Cloning of animals by nuclear transfer

## 1MSZO04 : GENERAL PHYSIOLOGY

### UNIT-I

1. Digestive system: 1.1 Nature of food-stuff 1.2 Various types of digestive enzymes and their action in alimentary canal, 1.3 Absorption and assimilation of food 1.4 Nervous and hormonal control of digestion 1.5 Energy balance  
2. Circulatory system: 2.1 Composition and function of blood, 2.2 Haemopoiesis, blood clotting, 2.3 Blood volume, blood volume regulation, 2.4 Immunity, homeostasis, 2.5 Comparative anatomy of heart structure, 2.6 Myogenic heart, ECG – its principle and significance, cardiac cycle, 2.7 Heartbeat, blood pressure and blood groups.  
3. Respiratory system: 3.1 Respiratory organs (gills, trachea and lungs), respiratory pigments 3.2 Mechanism of breathing, 3.3 Physiology of respiration, control of breathing, 3.4 Aerodynamics and BMR.

### UNIT-II

4. Excretory system: 4.1 Comparative physiology of excretion, 4.2 Functional architecture of kidney and nephron, 4.3 Nitrogenous end products, formation of urine and its hormonal control, 4.4 Role of kidney in osmoregulation, urine concentration, 4.5 Waste elimination, micturition 4.6 Electrolyte balance, acid-base balance.  
5. Muscular system: 5.1 Types and properties of muscles, 5.2 Functional architecture of skeletal muscles, 5.3 Biophysical and biochemical events during muscular activity.  
6. Nervous system: 6.1 Functional architecture of neurons, 6.2 Origin and propagation of nerve impulse through axon, 6.3 Action potential, synaptic transmission, 6.4 Reflex arc and reflex action, 6.5 Gross neuroanatomy of the brain and spinal cord, 6.6 Central and peripheral nervous system, 6.7 Neural control of muscle tone and posture.

### UNIT-III

7. Sense organs: 7.1 Structural architecture and functioning of eyes and ears, 7.2 Tactile response.  
8. Thermoregulation and cold tolerance: 8.1 Heat balance and exchange, endotherms vs ectotherms, 8.2 Counter-current heat exchanger, 8.3 Torpor, hibernation and aestivation, 8.4 Adaptations to extreme climate, 8.5 Comfort zone, body temperature- physical, chemical and neural regulation.  
9. Stress: 9.1 Basic concepts of environmental stress and strain, 9.2 Homeostasis, physiological response to body exercise, 9.3 Meditation, yoga and their effects

### UNIT-IV

10. Endocrinology: 10.1 Endocrine glands in vertebrates, hormones and related diseases. 11. Reproduction: 11.1 Reproductive cycle, 11.2

Reproductive processes (implantation, parturition and lactation),  
neuroendocrine regulators in insects and mammals, pheromones.

## 1MSZO05 : BIOCHEMISTRY

### UNIT I

1 The scope of biochemistry, 1.1 Biomolecules, 1.2 Chemical bonds, 1.3 pH  
1.4 Acid, Base, Buffer 1. 1.5 Concept of free energy. 2. Proteins:  
Covalent properties of Proteins 2.1 Structure and chemistry of amino acids 2.2  
Isolation and purification of protein 2.3 Protein sequencing 2.4 Peptide  
synthesis 2.5 Covalent modifications 2.6 Protein splicing Protein secondary  
and tertiary structure 2.7 Peptides and peptide bonds 2.8 Ramchandran plots  
and amino acid propensities 2.9 Common secondary structures 2.10 Protein  
tertiary structure and, folding patterns 2.11 Common tertiary structural motifs.  
2.12 Role of packing constraints in tertiary structure patterns. 2.13 Divergent  
vs. convergent evolution of similar structure. Globular and fibrous proteins.  
2.14 Water and the hydrophobic effect 2.15 Tertiary and quaternary effect.  
2.16 Motifs in globular proteins 2.17 Properties of protein interiors and surfaces.  
2.18 Fibrous proteins (keratin, fibroin, collagen and elastin) Protein folding and  
thermodynamics 2.19 Protein folding and dynamics 2.20 Folding Overview:  
the Levinthal paradox 2.21 Condensation and molten globules 2.22 Chaperon-

assisted protein folding

2.23 Amino acid sequence variation and protein misfolding diseases  
Allostery (Hemoglobin), Myoglobin structure and oxygen binding 2.24  
Hemoglobin subunits cooperatively, the Hill coefficient. 2.25 Quaternary  
structure changes and Sickle cell and other molecular diseases

### UNIT II

3. Carbohydrates: Structure and biological importance of- 3.1 Monosaccharide,  
3.2 Oligosaccharides 3.3 Polysaccharides (Storage and  
structural polysaccharides, glycosaminoglycans 3.4  
Glycoconjugates (glycoprotein and proteoglycans) 4. Lipids 4.1 Fatty acids:  
structure, nomenclature, acyl glycerols, wax, phospholipids, sphingolipids,  
glycolipids, lipoproteins 4.2 Terpenoids and sterols: structure, properties and  
function 4.3 Function of lipids 4.4 Signal transducing molecules 5. Nucleic acid  
structure 5.1 Nucleotides 5.2 Primary structure of nucleic acid. 5.2 Secondary  
and tertiary structures of nucleic acids; Triple helices and H- DNA; unusual  
secondary structure of DNA 5.3 Duplex stability 5.4 Hybridization 5.5 DNA and  
RNA sequencing.

### UNIT III

6. Vitamins 6.1 Classification, structure, occurrence and functions of fat  
soluble vitamins 6.2 Classification, structure, occurrence and biological  
functions water soluble vitamins 6.3 Phenolics and alkaloids: structure,  
biological properties and functions 7. Enzymes: 7.1 Enzyme as biocatalyst 7.2  
The kinetics of enzyme catalysis 7.3 Principles of enzyme catalysis 7.4  
Proteases, polymerases, other examples 7.5 Coenzymes and Cofactor 7.6  
Isozymes 7.7 Enzyme inhibition 7.8 Allosteric enzyme 7.9 RNA  
catalysis 7.10 Chemistry and structure of ribozymes

7.11 Evolutionary implications 7.12 Immobilized enzymes and their applications

7.13 Enzymes as biosensor

UNIT IV

8. Metabolism 8.1 Catabolism, anabolism, Metabolic

pathway, regulation, concept of free energy 8.2 Carbohydrate metabolism:

Enzymatic reaction, regulation and importance of Glycolysis, Citric acid cycle.

Pentose phosphate pathway, glycogenolysis, glycogenesis, gluconeogenesis. 8.3

Lipid metabolism

: fatty acid oxidation, fatty acid biosynthesis, biosynthesis of triglycerides, Cholesterol

. 8.4 Amino acid metabolism: Catabolism of amino acid, transamination,

deamination, biosynthesis of nonessential amino acid, fate of carbon skeleton. 8.5

Nucleotide metabolism: Degradation of purine and pyrimidines nucleotides,  
biosynthesis (De novo, salvage pathways) of purine and pyrimidine nucleotides

8.6 Oxidative phosphorylation and mechanism of ATP biosynthesis. 9. Inborn

error of metabolism: (Important diseases of

9.1 carbohydrate 9.2 protein 9.3 lipid 9.4 nucleotide metabolism

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error of metabolism: (Important diseases of

9.1 carbohydrate 9.2 protein 9.3 lipid 9.4 nucleotide metabolism

1MSZO06 : BIostatISTICS AND POPULATION

GENETICS

UNIT I

1. Introduction to Biostatistics 1.1 Definitions of biostatistics 1.2

Statistical symbols 1.3 Scope & Applications of biostatistics 1.4 Collection,

organization and representation of data 2. Measures of Variability 2.1 Mean

deviation 2.2 Standard deviation 2.3 Variance and coefficient of variation 3.

Correlation and Regression 3.1 Types of correlation 3.2 Methods of studying

correlation 3.3 Regression analysis 3.4 Uses of regression analysis

UNIT II

4. Tests of Significance 4.1 Significance of difference in means Standard

error of mean 4.3 Student's t-test 4.4 F-test 5. Chi-square test 5.1 Testing

goodness of fit 5.2 Chi-square distribution and characteristics 5.3 Applications

of Chi-square test 5.4 Yate's correction 6. Analysis of Variance 6.1 One-

way classification 6.2 Two-way classification

### UNIT III

5. Genetics of Quantitative traits in populations 5.1 Analysis of quantitative traits 5.2 Quantitative traits and natural selection 5.3 Estimation of heritability 5.4 Genotype-environment interactions 5.5 Molecular analysis of quantitative traits 5.6 Phenotypic plasticity 6. Molecular Evolution 6.1 Gene Evolution 6.2 Evolution of gene families 6.3 Molecular drive

### UNIT IV

7. Molecular Phylogenetics 7.1 How to construct phylogenetic trees 7.2 Phylogenetic inference- Distance methods, parsimony methods, maximum likelihood Method 7.3 Immunological techniques 7.4 Amino acid sequence and phylogeny 7.5 Nucleic acid phylogeny- DNA- DNA hybridizations, Restriction Enzyme sites, Nucleotide sequence comparisons and homologies. 7.6 Molecular

M.Sc. (Zoology) II year

### 2MSZO01: BIOLOGY OF CHORDATES

#### UNIT I

1. Origin and outline classification of the chordates. 2. Salient features and Interrelationships of Hemichordate, Urochordata and Cephalochordata. 3. Origin, evolution and adaptive radiation of chordates. 4. Origin, evolution and general characters of Agnatha: Ostracoderms and Cyclostomes. 5. The early Gnathostomes (Placoderms).

#### UNIT II

6. A general account of the Elasmobranchii, Holocephali, Dipnoi and Crosspterygii. 7. Adaptive radiation in bony fishes. 8. Origin, evolution and adaptive radiation of Amphibia. 9. Parental care in Amphibia 10. Neotany in Amphibia

#### UNIT III

11. Origin and evolution of Reptiles: Seymouria and Cotylosauria. 12. Skull of Reptiles. 13. Venom in Ophidians. 14. Dinosaurs. 15. Living reptiles: a brief account of Rhynchocephalia. Chelonia, Crocodilia and Squamata.

#### UNIT IV

16. Origin and evolution of birds. 17. Origin of flight: Flight adaptations. 18. Flightless Birds. 19. Modifications of Beak, Feet and Palate in Birds. 20. Origins of mammals: Primitive mammals (Prototheria and Metatheria). 21. General account on adaptive radiations in Eutherian mammals. 22. Evolution of man.

### 2MSZO02: ENVIRONMENTAL BIOLOGY AND ETHOLOGY

#### UNIT I

1. Ecological law of minimum and law of tolerance 2. Ecological niches, overlapping of niches, ecotone 3. Energy flow, food chain, food web and trophic levels, ecological pyramids 4. Nutrient cycles in nature - carbon, nitrogen, phosphorus and water. 5. Ecozones of India - habitat and fauna 6. Population ecology: 6.1 Characteristics of a population 6.2 Population

growth curves, population regulation 6.3 Life history strategies (r and K selection) 7 Environmental Pollution - air, water, noise and radiation (electromagnetic and ionizing); carbon footprint

#### UNIT II

8. Biodiversity : 8.1 Species diversity, ecosystem diversity, genetic diversity and molecular Diversity. 8.2 Alpha, Beta and Gamma Diversity 8.3 Biodiversity indices. Measuring - species richness, species evenness Simpson's diversity Index and Shannon's diversity index 8.4 Biodiversity act of India and Biodiversity hotspots in India (with special reference to Western Ghats and

North east), UNESCO heritage sites (Kaziranga National Park) 9 Ecological communities: (succession, zonation, environment, biota and adaptations)

9.1 Terrestrial 9.2 Fresh water 9.3 Marine and estuarine 10. Climatic Changes - El Niño and La Niña, Earthquakes and Tsunami 11. Elementary knowledge of : Wildlife acts and schedules, CITES, TRAFFIC, WWF, Ramsar convention, IUCN, ZSI, ZAI, ENVIS, IGCMC, Project Tiger, Biosphere reserves, world heritage sites and hotspots.

#### UNIT-III

12. Scientists and their works : Konrad Lorenz, Niko Tinbergen, Karl Von Frisch, Skinner B F and Harlow Harry, Richard Dawkins, EO Wilson,

Desmond Morris 13. Concepts of Ethology (SS, FAP, ASE, IRM), Flush Toilet model; Genes and behaviour; Evolution of behaviour, Development of behavior

14. Neuroethology : 14.1 Methods of studying brain and behaviour: neuroanatomical, neurophysiological and neurochemical 14.2 Basic knowledge of EEG, LASER, PET, CAT, MRI and nuclear medicine imaging 14.3 Mammalian Brain and Behaviour, Limbic system and hypothalamus 14.4 Sleep - arousal and reticular formation 15. Definition of Social behaviour 15.1 Properties and advantages of social grouping, social group of monkeys 15.2 Sociobiology - Darwinian fitness, individual fitness, kin selection, group selection, cooperation, reciprocation, altruism, reciprocal altruism, Proximate and Ultimate causations 15.3 Home range, territory, core area and aggression

15.4 Human behaviour

#### UNIT IV

16. Feeding and sexual strategies in animals 17. Parental care in animals 18. Communication in animals - vocal, tactile, visual and chemical 19. Learning: 19.1 Introduction and definition 19.2 Types - Habituation, trial and error, conditioning, cognition and imprinting 19.3 Short and long term memory, neural mechanism of learning

#### 2MSZO03: GENES AND DIFFERENTIATION

#### UNIT I

1. Introduction to animal development 1.1 Problems of development biology 1.2 Develop patterns in metazoans 1.3 Development in unicellular eukaryotes



2. Creating multicellularity 2.1 Cleavage types 2.2 Comparative account of gastrulation 3. Early vertebrate development 3.1 Neurulation and ectoderm 3.2 Mesoderm and endoderm 4. Cytoplasmic determinants and autonomous cell specification 4.1 Cell commitment and differentiation 4.2 Cell specification in nematodes 4.3 Germ cell determinants 4.4 Germ Cell Migration 4.5 Progressive cell-cell interaction and cell specification fate

#### UNIT II

5. Body Axes 5.1 Establishment of body axes in mammals and birds 5.2 Proximate tissue interactions 5.3 Genetics of axis specifications in *Drosophila* 6. Homeobox concept in different phylogenetic groups 7. Tetrapod limb development 8. Hormones as mediators of development 8.1 Amphibian metamorphosis 8.2 Insect metamorphosis 8.3 Ovarian luteinization and mammary gland differentiation.

#### UNIT III

9. Environmental evolution and animal development. 9.1 Environmental cues and effects 9.2 Malformations and disruptions. 9.3 Changing evolution through development modularity 9.4 Developmental constraints 9.5 Creating new cell types - basic evolutionary mystery. 10. Biology of sex determination 10.1 Chromosomal sex determination - Mammals and *Drosophila* 10.2 Testis determination genes 10.3 Ovarian development 10.4 Secondary sex determination in mammals. 10.5 Environmental sex determination

#### UNIT IV

11. Cell diversification in early embryo 11.1 *Xenopus* blastomeres 11.2 Morphogen gradients 11.3 Totipotency & Pluripotency 11.4 Embryonic stem cells. 11.5 Renewal by stem cells - epidermis 11.6 Skeletal muscle regeneration 11.7 Connective tissue cell family 12. Hemopoietic stem cells 12.1 Stem cell disorders. 12.2 Blood cell formation 12.3 Bone marrow transplants 12.4 Gene therapy.

#### 2MSZO04 : TOOLS & TECHNIQUES

##### UNIT I

1. Principle, construction and application of 1.1 Light Microscopy 1.2 Phase contrast Microscopy 1.3 Interference Microscopy 1.4 Polarized Microscopy 1.5 Fluorescence Microscopy 1.6 Electron Microscopy (TEM+SEM) 1.7 Confocal and Atomic Force Microscopy

##### UNIT II

2. Electrophoresis; Principle, construction, application and equipment used 2.1 Various types such as; paper, agarose, PAGE, submerged DNA, Pulse chase 2.2 Isoelectric focusing points and capillary electrophoresis 2.3 Various media for Electrophoresis 3. Chromatography; Principle, construction, application and equipment used 3.1 Various types such as; paper, TLC, GLC, HPLC, Ion-Exchange and affinity chromatography.

##### UNIT III

4. Colorimetry and Spectrophotometry; Principle, construction, application and equipment used 4.1 Various types such as; fluorescence, UV, IR,

Atomic Absorption 4.2 Lambert-Beer's Law 5. Principle and application of radiations in biology 5.1 Radiation Dosimetry and equipment used for it 5.2 Radioisotopes, types, characteristics and uses of 5.3 Tracer techniques in biology 5.4 Scintillation techniques

#### UNIT IV

6 Principle of cytological and cytochemical techniques 6.1 Fixation,

chemical basis of fixation by formaldehyde, glutaraldehyde, chromium salts, mercuric salts, osmium salts, alcohol and acetone. 6.2 Chemical basis of Staining of carbohydrates, proteins, lipids and nucleic acids. 7 Cell and Tissue Culture techniques 7.1 Design and functioning of tissue culture laboratory 7.2 Cell proliferation measurements 7.3 Cell viability testing 7.4 Culture media preparation and harvesting techniques.

2MSZO5 ENTOMOLOGY: INSECT MORPHOLOGY,

PHYSIOLOGY,

#### UNIT-I

1. General organization of insect body, 1.1 Integument 1.2 Head: sutures and area of cranium, tentorium, Gnathal appendages. 1.3 Thorax: Legs and their modifications, wings and wing coupling.

#### UNIT-II

2. (a) Digestive system 2.1 Alimentary canal and its modifications 2.2 Physiology of digestion. 3. Physiology of circulatory system 4. Excretory system and its modifications 5. Respiratory system and its modifications, adaptations for aquatic respiration.

#### UNIT-III

6. Nervous system and its modifications. 7. Morphology and physiology of neuroendocrine system. 8. Sense organs: Mechanoreceptors, Chemoreceptor. 9.

Auditory organs, light producing organ, sound producing organ, visual organ (Compound eye and ocelli). 10. Muscular system and distribution of muscles. UNIT-IV

11. Reproductive system. Morphology and physiology of male and female, reproductive system, its associated ducts and glands and external genitalia. 12. Embryology:- Structure of egg, embryonic and postembryonic development, 13. Types of larvae, pupae and metamorphosis.

2MSZO6 ENTOMOLOGY: INSECT SYSTEMATIC, ECOLOGY AND

APPLIED ENTOMOLOGY

#### UNIT-I

1. Historical review of insect classification. Basis of insect classification. Phylogeny of Arthropoda and Hexapoda. Introduction to primitive insects. 2. Detailed classification of important and selected super

families and families of the following orders- Orthoptera, Isoptera, Hemiptera, Coleoptera, Lepidoptera, Diptera and Hymenoptera.

#### UNIT-II

3. Social life in Isoptera and Hymenoptera. Life cycle of locusts and aphids.

4. Origin and evolution of insects with special reference to fossil insects. Causes of success of insects.

#### UNIT-III

5. Ecology of insects- (a) Effect of physical factors. (b) Intra and inter specific relations. (Biotic factors) (c) Insect-plant interaction.

#### UNIT-IV

6. Population ecology: Population dynamics, size, fluctuation, biogeography, community ecology, species interaction, community structure, diversity. 7. Biochemical adaptations to environmental stress (metamorphosis, diapause, polymorphisms, swarms, outbreaks and migration).

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