Eklavya University

SESSION

2023-24

M.Sc. PREVIOUS

SYLLABUS

OF

ZOOLOGY

School of Basic and Applied Sciences

EKLAVYA UNIVERSITY, DAMOH (M.P.)

Scheme of Examination M.Sc I Year (Previous)

/For batch admitted in Academic Session 2023-24/

Subject wise distribution of marks and corresponding credits

S. No.	Subject Name	Subject Code	Paper Name	Maximum Marks Allotted												Total Marks	Contact Periods Per week			Total Credits
				Theory Slot											Practical Slot					
				Final Yearly					Half Yearly					Quiz/ Assignment/ Attendence	End Sem	Lab Work/ Sessional				
				P1	P2	P3	P4	P5	P1	P2	P3	P4	P5				L	T	P	
1	Zoology	MZOOL20Y101	Invertebrates and Principle of Animal Taxonomy (Paper - I)	60					30					10			100	4			4
		MZOOL20Y102	Biology, Chemistry, Physiology and Immunology (Paper - II)		60					30				10			100	4			4
		MZOOL20Y103	Cell Biology, Genetics and Biotechnology (Paper -III)			60					30			10			100	4			4
		MZOOL20Y104	Evolution and Statistical methods in biology (Paper -IV)				60					30		10			100	4			4
		MZOOL20Y105	Paper- I and II Practical- I Sitting (Practical-I)												60	40	100			4	4
		MZOOL20Y106	Paper- III and IV Practical- II Sitting (Practical-II)												60	40	100			4	4
Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiencey Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.																				

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School of Basic and Applied Sciences

Class			M.Sc. Zoology (Previous)
Semester/Year			I Year
Subject & Paper Code			Zoology - MZOOL20Y101
Paper			Invertebrates and Principles of Animal Taxonomy - I
Max. Marks			60
Credit			Total Credits
L	T	P	4
4	0	0	

Course Objectives:

At the end students should be able to:

1. Describe and explain the basic principles of animal classification, form and function among invertebrate phyla.
2. Identify and classify the main groups of invertebrates.
3. Describe the main elements of the biology and evolutionary relationships of the major groups of invertebrates.

Course Outcome:

At the end of the course, learners will be able to:

1. Provides students with an in-depth knowledge of the diversity in form, structure and habits of invertebrates.
2. Learn basics of systematics and understand hierarchy of different categories.
3. Learn diagnostic characteristics of different phyla through brief studies of examples.
4. Obtain overview of economically important invertebrates.
5. Classify all the invertebrate phyla up to class.

Student Learning Outcomes (SLO):

Students will:

1. Be able to describe unique characters of protozoa, porifera, coelenterate and helminthes.
2. Be able to recognize life functions of protozoa, porifera, coelenterate and helminthes.
3. Recognise the ecological role of phylum protozoa, porifera, coelenterate and helminthes.
4. Recognise the diversity from protozoa, porifera, coelenterate and helminthes.

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Unit	Syllabus	Perio
UNIT - I	A study of the classification of invertebrates with distinguishing features & examples of various subdivisions. **Locomotory mechanisms:** a) Amoeboid movements,ultra structure of cilia and flagella:ciliary and flagellar movements;molecular and physiological mechanisms involved in the three kinds of movements. b) Myonemes and muscle fibers in invertebrate structure and their role in locomotion. c) Locomotion in relation to hydrostatics, coelome, metamerism, arthropodization. d) Anoutline of flight mechanism in insects. **Feeding mechanisms:** a) Amoeboid feeding. b) Ciliary feeding. c) Filterfeeding d) Parasitic mode of feeding. e) Feeding mechanisms in insect and echinoderms.	15
UNIT - II	**Respiration:** a) Respiration in lower invertebrates (Protozoans to helminthes). b) Gills and Lophophores.c)Gills and lungsin Mollusca. d) Gills,trachea and lung like structures in Arthropods. e) Physiology of respiratory pigments in invertebrates. **Excretion:** Study of structural and functional organization of excretory systems in various invrertebrate groups and a survey of various excretory products met with in them. Osmoregulation and ionic regulation: a survery of principal mechanisms in fresh water, marine and terrestrial forms.	15
UNIT - III	Structural and functional organization of nervous systems and receptors : a) Plan of nervous systems in the Cocenferates, Platyhelminthes, Annelids, Arthropods. Molluscs and Echinoderms: structural and functional complexities of brain and ganglionic structures. b) Receptors : Structural and functional organization of the mechanoreceptors. chemoreceptors and photo receptors. Endocrine system:asurey of endocrinal structures and their hormones: role of neurosecretions and hormones in developmental events of insects and crustaceans. **Reproduction:** a) Reproduction in Protozoa b) Reproduction in Porifera c) Reproduction in Metazoa: Sexual reproduction; Parthenogenesis. d) Reproduction in Metazoa: Asexual reproduction in Coelenterata and Polychaeta. e) Larval forms and their significance.	15

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UNIT - IV	Criteria for phylogenetic inter relationships between Invertebrate phyla. Origin of Parazoa, Mesozoa and Metazoa. Origin or Radiata (Coelenterata and Ctenophora). Origin of Bilateria from Radiata (Importance of Planula larva and Ctenophores) Phylogenetic significance of Rhynchocoela. Inter relationship of important Pesudocelomate groups, Rotifera. Gastrotricha, Kinorhynca, Nematomorpha and Entoprocta. Affinities and evolutionary significance of the unsegmented lesser protostome phyla (Priapulida, Echiuroidea and Sipunculida.Phylogenetic relationship between the coelomatephyla (Annelida, Onychophora. Arthropoda & Mollusca). Affinities and evolutionary significance of the Lophophorate, coelomatephyla (Brachiopoda, Phoronida & Ectoprocta). Affinities of the invertebrate deuterostomephyla (Chaetognatha, Echinodermata, Pogonophora & Hemichordata).	15
UNIT - V	Introduction to the Science of taxonomy; Rules of nomenclature. Principles of classification theories of biological classification & their history; the species category; the polytypic species; population systematic intraspecific categories. Methods of classification: taxonomic collection & the processes of identification, taxonomic characters; types of variations (qualitative and quantitative) with in a single population, methods of arriving at taxonomic decisions on species level; preparation and use of taxonomic keys. Cytotaxonomy: importance of cytology and genetics in taxonomy.	15

References:

1 Elements of Taxonomy by E-Mayer .

2 Principle of animal taxonomy oxford IBH publication company by G.G. –Simpson.

3 Mathematical Biology-Springer,Verlag, Berlin by Murry J.D.

4 Ptinciple of animal taxonomy, by Ashok Verma.

5 A Text Book of invertebrates,by N.Arumujan,T.Murugan,M.G.Ragunathan.

6 Hyman,L.H. The invertebrates,Nol. I Protozoa through Ctenophora.

7 Barrington,E.J.W. Invertebrate Structure and Function by Thoomas Nelson. Anmd sons Ltd. London.

8 Read ,C.P. Animal Parasitism,

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School of Basic and Applied Sciences

Class			M.Sc. Zoology (Previous)
Semester/Year			I Year
Subject & Paper Code			Zoology - MZOOL20Y102
Paper			Biological Chemistry,Physiology & Immunology - II
Max. Marks			60
Credit			Total Credits
L	T	P	4
4	0	0	

Course Objectives:

The course aims to provide an advanced understanding of the core principles and topics of Biochemistry and their experimental basis, and to enable students to acquire a specialised knowledge and understanding of selected aspects by means of a stem/branch lecture series and a research project.

Course Outcome:

At the end of the course, learners will be able to:

1. Identifie the five classes of polymeric biomolecules and their monomeric building blocks.
2. Explain the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action.
3. Integrate Understanding of physiological mechanisms.
4. Outline the key components of the innate and adaptive immune responses.
5. Describe about cell types and organs which are involved in an immune response.

Student Learning Outcomes (SLO):

Students will:

1. Understand of the overview of immune system including cells, organs and receptors.
2. learn structure and functions of different classes of immunoglobulins, the genetic.
3. Basis of antibody diversity and the importance of humoral, cell-mediated and innate immune responses in combating pathogens.
4. Get acquainted with the importance of antigen-antibody interaction in disease diagnosis.
5. Get acquainted with the discovery of antibiotics and their targets, drug/antibiotic resistance, preventive and therapeutic approaches of infectious diseases, hospital acquired infections.

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Unit	Syllabus	Periods
UNIT - I	Basic chemical concepts : a study of the chemical bonds and functional groups. Biocatalysts:Classification and nomenclature of the enzymes;nature of enzymes, enzyme specificity; factors affecting enzyme activity; enzymatic and non-enzymatic catalysts; coenzymes and their functions. Energy considerations: Biological oxidation & reduction. Fundamental reactions of biological oxidation; redoxpotential and electron transport system, enzymes and prosthetic groups. Metabolic pathways of protein, carbohydrates, lipids and nucleicacids (including sequence determination).	15
UNIT - II	Physiology of the nervous system: (a) Nerve impulse: Molecular physiology of nerve impulse. (b) Synapse physiology and integration of information; coding in the neural information processing. Neuro transmitters. (c) Reflexaction: Various types of central and peripheral reflexes in mammalian nervous system. Physiology of the receptor system: (a) General mechanism involved in stimulus transduction at receptor sites. (b) Functional architecture and stimulus processing in retina, organ of Corti and olfactory, epithelium.	15
UNIT - III	Physiology of Respiration: Regulation of breathing and transport of O_2 and CO_2. An elementary idea of emplay send asthma accupational disorders and spirometry. Stress Physiology: A general idea of stress physiology with special reference to elastic and plastic strain, stress resistance avoidance and tolerance. Physiological response to oxygen deficient stress and body exercise. Concept of homoeostasis, adaptations and aclimalization.	15
UNIT - IV	Innate and Acquired Immunity, phylogeny and ontogeny of Immune system, organiaztion and structure of lymphoid organs, cells of the immune system and their differentiation. Nature of Immune responses, Nature of antigens and factors influencing Immunogenicity, epitopes and haptens.	15
UNIT - V	Structure and functions of Antibodies, Antigen-Antibody interactions in-vitro and in-vivo complement system, Major histocompatibility complex in mouse and HLA system in humans. Organization and expression of Ig genes. T-cell and B-cell generation, activation and differentiation. Cytokines cell médiated effector functions. Immunological tolerance and Anti-immunity;Hypersensitivity and immune responses to infection agents especially intracellular parasites.	15

References:

1 Anatomy, Physiology and Biochemistry by Anjula Vij.

2 Anatomy, Physiology and Biochemistry by N.Arumurugan.

3 A Text Book of Immunology by Dr.B.Anandurai.

4 A Text Book of Immunology by Dr. P.Madhaveelatha.

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Class				M.Sc. (Previous)
Semester/Year				I Year
Subject & Paper Code				Zoology - MZOOL20Y103
Paper				Cell Biology, Genetics and Biotechnology - III
Max. Marks				60
Credit			Total Credits	
L	T	P	4	
4	0	0		

Course Objectives:

To understand the structure of cell and its various organelles.
To understand the various aspects of structure and functions of living cells.
To acquire broad knowledge on basic and recent trends of genetics .

Course Outcome:

At the end of the course, learners will be able to:
1.Get overview of cell.
2.Describe the structure and function of plasma membrane.
3.Learn about Structure, functions and interactions of cell organelles and inclusions.
4.Describe gene action.
5.Describe mutation, mutagenesis and repair.

Student Learning Outcomes (SLO):

Students will:
1.Understand the structure and function of cell and its organells.
2.Acquire combined knowledge on Cell division and cell cycle.
3.Analyse the various factors determining the heredity from one generation to another.
4.Acquire knowledge with special emphasis on molecular mechanism of heredity.

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Unit	Syllabus	Periods
UNIT - I	1. A general idea of properties of light, lenses and magnification power. An elementary knowledge of principles and functioning of light (dissecting and compound), interference, polarising, fluorescence, phase contrast, UV and electron (SEM and TEM) microscopes. 2. Cytological techniques: Centrifugation and ultracentrifugation, intravital and supravital staining, preparation of cell cultures, isolation and fractionation of cell. 3. Plasma membrane and intracellular compartments: Structure and functions of membrane, principles of membrane transport, carrier proteins, ion channels. Structure and functions of endoplasmic reticulum. Signal recognition particles, ER signal peptides; signal transduction. 4. Vesicular traffic organelles: Structure and functions of Golgi complex and lysosomes, transport from Golgi bodies to lysosomes. Endocytosis and exocytosis; structure and functions of microbodies, glyoxysomes, peroxysomes, and spherosomes. 5. Energy transducers and other organelles: Structure, functions and evolution of mitochondria and plastids; their role as energy transducers. Structure and functions of ribosomes; structure of cilia, flagella, vacuoles and cytoskeleton.	15
UNIT - II	1. Nucleus: Structure of interphase nucleus, pore compex, nucleoplasm and nucleolus. 2. Chromosomes: Chromatin organisation in dividing and nondividing cells, structure of chromosomes, solenoid model, importance of C-value paradox. centromere and telomere, karyotype, banding techniques, FISH, GISH, Mc FISH, cytometry ; giant and mini chromosomes. 3. Cell cycle and mitosis: Stages of cell cycle (G1, S, G2 and M stage), centriole cycle, mechanism of mitosis, anaphasic movements. 4. Mechanism of meiosis, nondisjunction. 5. Regulation of cell division and abnormalities: Genetic regulation of cell cycle, check points, cyclins, MPF, chalones, mitotic poisons; molecular oigin of cancer; apoptosis.	15
UNIT - III	1. Basics: Definitions of heredity, variation, gene, allele, autosomes, allosomes, homologous chromosomes, locus, homozygos, heterozygos, hemizygos, dominant, recessive, phenotype, genotype, filial generations, test cross, back cross, reciprocal cross, probable gamete formation for cross, use of symbols. 2. Laws of heredity and their variations: Works of Mendel and Morgan; incomplete dominance, multiple allele, pleotropy, genetic interactions. 3. Linkage and crossing over: Mechanism of crossing over, linkage groups, linkage maps; acessory genetic elements (plasmids, transposons and reteroelements). 4. Genetics of sex: Sex linkage, sex influenced and sex limited traits, sex determination, effects of environment on sex determination. 5. Human genetics: Abnormalities in chromosome structure and number, Inborne errors of metabolism, eugenics, euphenics and euthenics, genetic counselling.	15

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UNIT - IV	1. DNA: Structure and types of DNA; DNA as a genetic material, gene structure, replication of DNA, enzymes and accessory proteins involved in DNA replication,DNA damage and repair, gene mutation and its molecular mechanism. 2. RNA: Structure and types of RNA (r-RNA, m-RNA, t-RNA, Hn-RNA, Sn-RNA, antisense- RNA); types of RNA polymerase, transcription, step initiation, chain elongation and termination; post transcriptional modification, cap and tail formation, RNA splicing. 3. Translation: Mechanism of prokaryotic and eukaryotic translation, protein folding; role of chaperons. 4. Gene regulation: Gene regulation in Prokaryota, positive and negative regulation- Lac operon, tryptophan operon; gene regulatory proteins (motifs); gene regulation in Eukaryota. 5. Applied Molecular Biology: RNA interference, molecular mechanism of antisense molecules, ribozymes, molecular mapping- RFLP analysis and its application in forensic, disease diagnosis and generic counselling.	15
UNIT - V	1. Basics: Genetic engineering, culture media, culture methods, restriction enzymes, cloning vectors, cell fusion, somatic hybridisation. 2. Recombinant DNA technology: Isolation of genetic materials gel-electrophoresis, amplification by PCR, insertion of r-DNA in host. 3. Bioreactors and downstream processing. 4. Biotechnology in agriculture: BT cotton, pest resistant and virus resistant plants,golden rice, flavr savr transgenic tomato. 5. Biotechnology in medicine: Humulin production, gene therapy, molecular diagnosis (DNA fingerprinting, ELISA), transgenic animals; liposomes (spheroplasts) in biomedical science.	15

References:

1 Cell Biology Genetics and Biotechnology, by Saras Publications.

2 Basic of Cell Biology and Biotechnology,by Dr.Arvinder Singh.

3 Cell Biology Genetics ,by P.K.Gupta.

4 Cell and Molecular biology,by P.K.Gupta.

5 Gene Biotechnology,by Jogdand.

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School of Basic and Applied Sciences

Class	M.Sc. Zoology (Previous)
Semester/Year	I Year
Subject & Paper Code	Zoology - MZOOL20Y104
Paper	Evolution and Statistical methods in biology - IV
Max. Marks	60

Credit			Total Credits
L	T	P	
4	0	0	4

Course Objectives:

To provide comprehensive overview of Concept of Evolution.
To explain Origin of Life especially Prokaryotes as well as Eukaryotes in detail.
To explore salient features of various theories of evolution comprising of Lamarckism, Darwinism and Neo-Darwinism.
To impart detailed understanding of Analogy, Homology, Paleontological Evidences, Embryological Evidences and Molecular Phylogeny.
To provide adequate information about Geological Time Scale and Neutral Theory of Molecular Evolution. To develop comprehensive knowledge regarding various Sources of Variations and their role in evolution,Introduction to biostatistics.

Course Outcome:

At the end of the course, learners will be able to:
1.Trace the Origin of life.
2. Established theories of evolution.
3.Correlate the theories with the evidences.
4.Explain the genetic basis of evolution.
5.Explain descriptive statistics.
6.Explain correlation and regression.
7.Explain graphical representation of data.
8.Fundamental concept of Hypothesis testing.

Student Learning Outcomes (SLO):

Students will:
1.Understand and describe fundamental processes of evolutionary change, including genetic. drift, natural selection, recombination (especially involving gene duplication), and mutation.
2.Understand how these processes interact and are modified by extrinsic factors, including. mutagens, interactions among species, and changing ecosystems.
3.Understand how these processes lead to small- and large-scale patterns of evolutionary change, including diversification, adaptation, and complexity .
4.Interpret phylogenetic trees and understand how they are reconstructed.
5.Use perturbations of Hardy-Weinberg equilibrium to infer activity of specific evolutionary processes.
6.Read and comprehend evolutionary biology advances described in contemporary primary literature.

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Unit	Syllabus	Periods
UNIT - I	1. Concepts of evolution and theories of organic evolution, Darwinism, Neo-Darwinism. 2. Geological time – scale 3. Hardy-Weinberg law of genetic equilibrium. A detailed account of destabilizing forces : (i) Natural selection (ii) Mutation (iii) Isolation and its role in species formation (iv) Genetic drift (v) Migration (vi) Meiotic drive.	15
UNIT - II	1. Quantifying genetic variability. (i) Genetic structure of natural populations (ii) Phenotypic variation (iii) Models explaining changes in genetic structure of populations 2. Molecular population genetics (i) Patterns of change in nucleotide and amino acid sequences (ii) Ecological significance of molecular variations (iii) Emergence of Non-Darwinism-Neutral Hypothesis 3. Genetics of quantitative traits in populations (i) Genotype-environment interactions (ii) Inbreeding depression and heterosis (iii) Molecular analysis of quantitative traits (iv) Phenotypic plasticity 4. Genetics of speciation. (i) Phylogenetic and biological concept of species (ii) Patterns and mechanisms of reproductive isolation (iii) Models of speciation (Allopatric, sympatric, parapatric).	15
UNIT - III	1. Molecular Evolution (i) Gene Evolution (ii) Evolution of gene families, Molecular drive (iii) Assessment of molecular variation 2 Origin of higher categories (i) Micro-and Macro-evolution 3. Characteristic of evolution Extinction, replacement, irreversibility of specialization etc. 4. Adaptation diversity & nature of adaptation : adaptive radiations & occupation of new environments & niches : mimicry and coloration.	15
UNIT - IV	1.Biostatstics Objective & signifycance : important terms & symbols, graphs (bar diagrams, histograms, frequency polygons, line diagrams) 2. Frequency distributions & centering constants (Mean, Median and Mode). 3. Measures of variation (standard deviation, variance, standard error of the Mean). 4. Rates and ratios. 5. Sampling variation of proportions, Significance of difference in proportions. 6. Chi-square test.	15
UNIT - V	1. Correlation and regression. 2. Analysis of Variance (ANOVA). 3. Probability distributions : Binomial, Poissans and normal. 4. Computer Applications in Zoological study: fundamentals of computer, History and generation of Computer. Computer Paripherals and architecture. Elementary idea, about operating system. DOS and window environment, elementary idea of MS-Office. Software used in biomedical science (image analysis system automation). 5. Bioinformatics : Elementary idea of bioinformatics and proteomics and Genomics	15

References:

1 Cocharan Statisical Methods of affiliated-East-West Press ,New Delhi by Sneedor. G.W. and W.G.

2 Bastcheler –F- Introduction to Mathematics for life scientists by Springer Verlas, Berling.

3 Murry J.D. Mathematical Biology by Springer,Verlag, Berlin.

4 Evolution and development biology,by Sastry,Tomar.

5 The origin of species,by Charles Darwin.

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School of Basic and Applied Sciences

Class	M.Sc. Zoology (Previous)				
Semester/Year	I Year				
Subject & Paper Code	Practical Zoology - MZOOL20Y105				
Paper	Paper- I and II, Practical I- Sitting	L	T	P	Total C.
Max. Marks	50= (30+20)	0	0	4	4

PRACTICALS

I. **Invertebrates :** I Identification, classification & study of distinguishing features of important representatives (Protozoa to Hemichordata).

II. Study of permanent prepared slides (Protozoa to Hemichordata).

III. **Anatomy :**

1 Reproductive, excretory, nervous & heamocoelomic systems of leech.

2 Nervous system and general anatomy: Patella, lamellidens, Mytilus and Aplysia.

3 General Anatomy, reproductive and nervous system of Cockroach, Grasshopper.

4 Study of sections of the arm of a starfish: water vascular system of starfish;

IV. **Permanent preparations and their study :**

1 Preparation of cultures of Amoeba, Paramaecium and Euglena.Study of these protozoans using vital dyes.

2 Permanent preparations of Amoeba. Paramaecium and Euglena from cultures, vorticella from the pond water; flagellates from the gut of white ant; Rectal ciliates, Trypansomes in the blood of house rat; lifecycle stages of Monocystis from the seminal vesicle of earthworm.

3 Collection, fixation & permanent preparations of trematodes, cestodes & nematodes found in sheep and pig and in the stool of infected persons.

4 Permanent preparations through various parts of Animals mentioned in III (i-iv) anatomy section and study of the structure.

5 Permanent preparations of different materials provided for study using microtome.

V. **Biological Chemistry :**

1 Identification of protein, carbohydrates and Lipid in various tissues.

2 Identification of different kinds of mono, di and poly saccharides in biological and chemical materials.

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3 Quantitative estimation of the following by spectrophotometric / semiautoanalyser method in various tissues. (a) Carbohydrates : Glycogen and glucose. (b) Proteins:Total proteins. (c) Lipid: Phospholipids and cholesterol. (d) Nucleic acids: DNA and RNA. (e) Enzymes: Acid and alkaline phosphatase.

4 Paper chromatography and Thin Layer Chromatography: Unidimensional chromatography using amino acids from purified samples and biological materials.

5 Study of digestive enzymes in different parts of alimentary canal.

VI. Physiology :

1. Elementary idea of Kymographic recording of muscle twitch, summation of twitches, chronic contractions, tetanus, fatigue & staircase phenomenon from the sciatic nerve muscle preparation of rat.

2. Study of ECG. Heart beat, Blood pressure.

3. Photometric determination of haemoglobin in blood sample.

4. Demonstration of the following in blood; clotting time. Bleeding time, erythrocyte sedimentation rate, haemolysis & crenation, differential count of leucocytes. 5. Determination of blood urea and blood sugar value.

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School of Basic and Appli ices

Class	M.Sc. Zoology (Previous)				
Semester/Year	I Year				
Subject & Paper Code	Practical Zoology - MZOOL20Y106				
Paper	Paper- III and IV, Practical II- Sitting	L	T	P	Total C
Max. Marks	50= (30+20)	0	0	4	4

PRACTICALS

I. Cell biology :

1 Squash & smear preparations of testis of cockroach / grasshopper : Acetocarmine & Feulgen staining of these preparations.

2 Study of mitosis in onion root tip and mammalian bone marrow cells.

3 Study of giant chromosomes in the salivary gland of Chironomus larva or Drosophila larva.

4 Vital and supra-vital staining (with neutral red and Janus Green B) of cells of the testis of an insect or mammal to study the mitochondria.

5 Chromosome counts in cells of the testis of an insect or mammal or cells of the bone marrow of a mammal, micrometry and image analysis.

6 Study of prepared microscopic slides of various cell types, mitosis, meiosis and giant Chromosomes.

II. Genetics :

1 Culture and identification of male and female Drosophila through prepared culture.

2 Identification of wild and mutant forms of Drosophila.

3 Problems based on Mendelism and gene interaction.

4 Identification of blood groups in man.

5 Demonstration of sex chromatin (Barr Bodies).

III. Statistical Methods of Biology :

1 Preparation of frequency tables and graphs (Computer based exercise).

2 Calculation of standard deviation, variance and standard error of the mean.

3 Correlation and rank of correlation.

4 Calculation of probability & significance between mean using t-test.

5 Calculation of significance using Chi-square test.

6 Plotting the slope of a line on a graph: calculations of the slope of a line, coefficient and regression.

7 Preparation of histogram, bar diagram and line graph preferably using computer.
Note : Use of animal for dissection and practical work is subject to the conditions that there are not banned under the wildlife protections act.

IV. Micro-Biology :

Demonstration of gram positive and gram negative bacteria.

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