



Hindi Vidya Prachar Samiti's
Ramniranjan Jhunjhunwala College
of Arts, Science and Commerce
(Autonomous College)

Affiliated to
UNIVERSITY OF MUMBAI

Syllabus for S.Y.B.Sc.
Program: B.Sc. Zoology
Program Code: RJSUZOO
(CBCS 2021-22)

DISTRIBUTION OF TOPICS AND CREDITS

S.Y.B.Sc. ZOOLOGY SEMESTER III

Course code	Nomenclature	Credits	Topic
RJSUZOO301	Type study, Life processes and Developmental biology	02	1. Type study Earthworm
			2. Life processes-I
			3. Developmental Biology
RJSUZOO302	Biochemistry, Genetics and Molecular Biology	02	4. Biochemistry- I
			5. Genetics
			6. Molecular Biology
RJSUZOO303	Ecology, Fishery Biology and Economic Entomology	02	7. Ecosystem ecology and community dynamics
			8. Fishery Biology
			9. Economic entomology
RJSUZOOP301, RJSUZOOP302 & RJSUZOOP303.	Practical I , II and III	03	Practicals based on Paper I, II and III

S.Y.B.Sc. ZOOLOGY SEMESTER IV

Course code	Nomenclature	Credits	Topic
RJSUZOO401	Type study, Life Processes and Cell biology	02	1.Type study-Cockroach
			2. Life processes-II
			3. Cell biology
RJSUZOO402	Biochemistry, Chromosomal inheritance and Evolution	02	4. Biochemistry-II
			5. Chromosomes and heredity
			6. Evolution
RJSUZOO403	Parasitology, Animal husbandry and Behavioural ethology	02	7. Parasitology
			8. Animal husbandry
			9. Behavioural ethology
RJSUZOOP401, RJSUZOOP402 and RJSUZOOP403.	Practical I,II & III	03	Practicals based on Paper I, II and III

SEMESTER-III (THEORY)		L	Cr
Paper- I Type Study, Life Processes And Developmental Biology		45	2
Paper Code: RJSUZOO301			
UNIT I		15	
Type study; Earthworm			
1	1.1 Classification and Salient features. 1.2 Digestive system 1.3 Circulatory system 1.4 Excretory system 1.5 Nervous system 1.6 Reproductive system, copulation, cocoon formation and development. 1.7 Locomotion 1.8 Economic importance		
UNIT II		15	
Life processes-I			
2	2.1 Study of Nutrition and Excretion 2.1.1 Comparative study of Nutritional Apparatus (structure and function): <i>Amoeba</i> , <i>Hydra</i> , <i>Amphioxus</i> , Pigeon, Ruminants. 2.1.2 Physiology of digestion in human 2.1.3 Comparative study of Excretory and Osmoregulatory structures and function a. <i>Amoeba</i> -contractile vacuoles b. <i>Planaria</i> -Flame cells c. Earthworm -Nephridia 2.1.4 Categorization of animals based on principle nitrogenous excretory products 2.1.5 Structure of kidney, Uriniferous tubule and physiology of urine formation in human. 2. 2 Study of Respiration 2.2.1 Comparative study of Respiratory organs (structure & function): Earthworm, Fish, Frog and Pigeon. 2.2.2 Structure of lungs and mechanism of breathing in human 2.3 Study of Reproduction 2.3.1 Asexual Reproduction- Fission, fragmentation, gemmule formation, budding. 2.3.2 Sexual reproduction; i. Gametogenesis ii. Structure of male and female gametes in human		
UNIT III		15	
Developmental Biology			
3	3.1. Fertilization i. Types of fertilization ii. Oviparity, viviparity, ovo-viviparity 3.2 Eggs and Cleavage		

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	A] Types of Eggs B] Types of Cleavage 3.3 Types of Blastulae: Amphibia, Bird and Mammal 3.4 Gastrulation: Epiboly, Emboly, invagination, involution and infiltration 3.5 Fate of three Germinal Layers and Coelom formation		
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S.Y.B.Sc	Semester III Theory
RJSUZOO301 Paper I– Type Study, Life Processes And Developmental Biology	Course Objectives: <ol style="list-style-type: none"> 1. To acquaint learners with the detail of earthworm as a representative of invertebrate. 2. To introduce the physiology of various life processes with evolutionary significance. 3. To introduce the learners to the basics of developmental biology Learning Outcomes: <ol style="list-style-type: none"> 1. Learners will get an idea of general characteristic and details of invertebrate animal. 2. Learners will be able to understand increase in complexity of physiology in evolutionary hierarchy. 3. Learners will be able to understand the processes involved in embryonic development

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SEMESTER-III (THEORY)		L	Cr
Paper- II Biochemistry, Genetics And Molecular Biology		45	2
Paper Code: RJSUZOO302			
UNIT I		15	
Biomolecules-I			
1	UNIT I: Biochemistry I 1.1 Fundamentals of Biochemistry. 1.1.1: Buffer, pKa, Henderson-Hasselbach equation. 1.1.2: Thermodynamics in Biochemistry, Concept of Bioenergetics. 1.1.3: Introduction to metabolism: Concept of metabolic pathways, anabolism, and catabolism. 1.2 Carbohydrate metabolism. 1.2.1 Carbohydrate metabolism-an overview. 1.2.2 Glycolysis, TCA cycle, ETS, anaerobic pathway. 1.2.3 Gluconeogenesis, HMP, Glycogenesis and Glycogenolysis. 1.2.4 Disorders: Diabetes mellitus, Glycogen storage diseases.		
UNIT II		15	
Genetics			
2	2.1 Introduction to genetics 2.1.1 Definition, scope and importance of genetics. 2.1.2 Classical and Modern concept of Gene (Cistron, muton, recon). 2.1.3 Brief explanation of the following terms: Allele, wild type and mutant alleles, locus, dominant and recessive traits, homozygous and heterozygous, genotype and phenotype. 2.2 Mendelian Genetics 2.2.1 Mendelian Genetics: Mendel's laws of Inheritance, Monohybrid cross, Dihybrid cross. 2.2.2 Exceptions to Mendelian Inheritance: Incomplete dominance, Co-dominance, Epistasis - Recessive, Double recessive, dominant and double dominant. 2.3 Multiple Alleles and Multiple Genes (Polygenes) 2.3.1 Concept of multiple alleles, Coat colour in rabbit, ABO and Rh blood group systems in man. 2.3.2 Polygenic inheritance with reference to skin colour. 2.4 Linkage and Crossing Over 2.4.1 Concept of Linkage and crossing over. 2.4.2 Mechanism and types of crossing over.		
UNIT III		15	
Molecular Biology			
3	3.1 Genetic material. 3.1.1 Experiments for proving DNA as genetic material in living organisms: Griffith's transformation experiment, Avery-Macleod and McCarty experiment, Hershey-Chase experiment. 3.1.2 RNA as genetic material: Singer & Conrat experiment. 3.1.3 Prokaryotes: Chromosomal DNA (Nucleoid) and plasmid (extrachromosomal DNA)		

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	<p>3.1.4 Eukaryotes: Extra-nuclear DNA in Mitochondria & Chloroplast.</p> <p>3.2 Genetic code: History, concept & properties.</p> <p>3.3 Flow of genetic information in prokaryotes: DNA replication, Transcription, Translation.</p> <p>3.4 Operon: Concept of Operon, Structure & regulation of lac operon.</p>		
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S.Y.B.Sc	Semester III Theory
<p>RJSUZOO302</p> <p>Paper- II Biochemistry, Genetics And Molecular Biology</p>	<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To introduce various concept of biochemistry and metabolism. 2. To introduce concepts of inheritance with special emphasis on Mendelian genetics, multiple allele, linkage and crossing over. 3. To introduce classical experiments of molecular biology, phenomenon of central dogma of protein synthesis and operon system. <p>Learning Outcomes:</p> <ol style="list-style-type: none"> 1. Learners would appreciate the importance of metabolism. 2. Learners would understand and apply the principle of inheritance. 3. Learners would understand the basics and processes of molecular biology.

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SEMESTER-III (THEORY)		L	Cr
Paper- III - Ecology, Fishery Biology And Economic Entomology		45	2
Paper Code: RJSUZOO303			
UNIT I		15	
Ecosystem ecology and community dynamics.			
1	1.1 Types of ecosystems; 1.1.1 Terrestrial ecosystem- Forest, grassland, desert and tundra 1.1.2 Aquatic ecosystem- Freshwater, estuarine and marine 1.2 Amazing ecosystems- Coral reef, Amazon Rainforest and Sunderbans 1.3 Ecological succession 1.3.1 Concept of succession. 1.3.2 Types of succession: Hydrosere and Xerosere. 1.3.3 Climax concept in succession.		
UNIT II		15	
Fishery biology			
2	2.1- Geographical and morphological features of coastline & fishing communities in India. 2.2- Brief classification of fisheries; a) Marine: coastal, offshore & deep sea fisheries b) Brackish water fisheries c) Fresh water fisheries 2.3- Important fisheries of India 2.3.1- Fin fish- Oil sardine, Mackerel, Bombay duck, Pomfret. 2.3.2- Crustacean fisheries- Prawns & lobsters. 2.3.3- Molluscan fisheries- Clams, edible oysters, loligo. 2.4- Methods of fish preservation. 2.5- Nutritive value of fish & fish products.		
UNIT III		15	
Economic Entomology			
3	3.1 Honey bee: Social life and communication, life history, Apiculture, Economic Importance 3.2 Lac insect: Life history, lac culture, composition of lac & its uses. 3.3 Silk moth: Life history, Sericulture, Economic Importance, types of silk. 3.4 Life history and control measures of Locust (<i>Schistocerca gregaria</i>), Aphids, Rice Weevil (<i>Sitophilus oryzae</i>). 3.5 Methods of insect control: Chemical control by synthetic and natural chemicals. 3.6 Biological control- <i>Bacillus thuringiensis</i> .		

S.Y.B.Sc	Semester III Theory
RJSUZOO303 Paper- III - Ecology, Fishery Biology And Economic Entomology	Course Objectives: <ol style="list-style-type: none">1. To introduce the concept of ecology, ecosystem and community dynamics.2. To introduce learners fishery biology with emphasis on classification, fishery community importance, method of preservation and notional value.3. To understand different aspect of economic entomology. Learning Outcomes: <ol style="list-style-type: none">1. Learners will get an idea about types of ecosystem and succession.2. Learners will be able to understand importance of fishery biology.3. Learners will be able to understand the processes involved apiculture, sericulture and control measures for crop pest.

SEMESTER-IV (THEORY)		L	Cr
Paper I- Types Study, Life Processes And Cell Biology Paper Code: RJSUZOO401		45	2
UNIT I		15	
Type Study: Cockroach			
1	1.1 Classification 1.2 External characters 1.3 Digestive system 1.4 Blood vascular system 1.5 Respiratory system 1.6 Nervous system 1.7 Excretory system 1.8 Reproductive system, copulation and fertilisation.		
UNIT II		15	
LIFE PROCESSES II			
2	2.1 Circulation: 2.1.1 Comparative study of circulation: Open and closed - single and double. 2.1.2 Types of circulating fluids- Water, coelomic fluid, haemolymph, lymph and blood. 2.1.3 Comparative study of vertebrate Hearts (Structure and function) 2.1.4 Structure and mechanism of working of heart in human 2.2 Locomotory organs -structures and functions. a. Pseudopodia in <i>Amoeba</i> (sol gel theory) b. Cilia in <i>Paramecium</i> , Ultrastructure of cilia & ciliary movement c. Structure of Striated muscle fibre in human and Sliding filament theory 2.3 Control and coordination 2.3.1 Irritability – <i>Paramecium</i> , Nerve net in <i>Hydra</i> . 2.3.2 Types of neurons on the basis of structure and function 2.3.3 Conduction of nerve impulse: Resting potential, action potential and refractory period 2.3.4 Synaptic transmission		
UNIT III		15	
CELL BIOLOGY			
3	3.1 Cellular Organization: Difference between Prokaryotes and Eukaryotes 3.2 Structure and function of Plasma membrane, Importance of membrane fluidity and asymmetry, Membrane Transport, Passive diffusion, facilitated transport, active transport, Exocytosis and endocytosis. 3.3 Cytoplasmic Membrane System: Structure and function a) Cytoskeleton: Microtubules and Microfilaments. b) Endoplasmic Reticulum: SER, RER c) Golgi Complex d) Lysosomes: Primary and Secondary Lysosomes 3.4 Mitochondria: Structure and function		

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	3.5 Structure of nucleus, Nuclear Pore and pore Complex, Nucleolus, Organization of Chromatin and Chromosomes.		
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S.Y.B.Sc	Semester IV Theory
RJSUZOO401 Paper- I Types Study, Life Processes And Cell Biology	Course Objectives: <ol style="list-style-type: none"> 1. To acquaint the learners with the detail of cockroach as a representative of invertebrate. 2. To introduce the physiology of various life processes with evolutionary significance. 3. To understand the learner structural and functional organization of cell. Learning Outcomes: <ol style="list-style-type: none"> 1. Learners will get an idea of general characteristic and details of invertebrate animal. 2. Learners will be able to understand increase in complexity of physiology in evolutionary hierarchy. 3. Learners will acquire insight of the structural and functional aspects of cell biology.

SEMESTER-IV (THEORY)		L	Cr
Paper II- Biochemistry, Chromosomal Inheritance And Cell Biology		45	2
Paper Code: RJSUZOO402			
UNIT I		15	
Biochemistry II			
1	1.1 Lipid Metabolism: 1.1.1 Overview, Triacylglycerol, β - Oxidation, Ketogenesis 1.1.2 Disorders: Obesity, Diabetic ketoacidosis, respiratory Distress syndrome 1.2 Protein Metabolism: Overview, 1.2.1 Metabolism of amino acids- transamination, deamination (oxidative and non-oxidative), Urea cycle. 1.2.2 Disorders of Urea cycle. 1.3 Intermediary metabolism: Acetyl – CoA as a common product in metabolism of carbohydrates, proteins and lipids.		
UNIT II		15	
Chromosomes and Heredity			
2	2.1 Chromosomes 2.1.1 Types of chromosomes–Autosomes and Sex chromosomes 2.1.2 Chromosome structure - Heterochromatin, Euchromatin 2.1.3 Classification based on the position of centromere 2.1.4 Endomitosis, Giant chromosomes- Polytene and Lamp brush chromosomes and significance of Balbiani rings. 2.2 Sex- determination 2.2.1 Chromosomal Mechanisms: XX-XO, XX-XY, ZZ-ZW. 2.2.2 Sex determination in honey bees- Haplodiploidy, 2.2.3 Sex determination in Drosophila-Genic balance theory. 2.2.4 Hormonal influence on sex determination-Freemartin and sex reversal. 2.2.5 Role of environmental factors- Bonellia and Crocodile 2.2.6 Barr bodies and Lyon hypothesis 2.3 Sex linked inheritance. 2.3.1 X-Linked: Colourblindness, Haemophilia 2.3.2 Y-linked: Hypertrichosis 2.4 Pedigree analysis Autosomal; dominant and recessive, X-linked; dominant and recessive.		
UNIT III		15	
EVOLUTION			
3	3.1: Geological timescale. 3.2 Theories of Evolution 3.3 Origin of life: Emergence of life on primitive earth 3.4: Evolution and adaptations: Microevolution, Role of natural selection in microevolution, Co-evolution. 3.5: Ecological niches and adaptations.		

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S.Y.B.Sc	Semester IV Theory
RJSUZOO402 Paper- II Biochemistry, Chromosomal Inheritance And Cell Biology	Course Objectives: <ol style="list-style-type: none"> 1. To introduce various concept of biochemistry and metabolism. 2. To introduce concepts of chromosome sex determination and chromosomal basis of inheritance. 3. To familiarize learner with concept of geological timescale, adaptation, origin of life with reference to evolution. Learning Outcomes: <ol style="list-style-type: none"> 1. Learners would appreciate the importance of metabolism. 2. Learners would able to correlate chromosome with principle of inheritance. 3. Learners would understand different aspects of evolution.

SEMESTER-IV (THEORY)		L	Cr
Paper III- Parasitology, Animal Husbandry And Behavioural Ethology		45	2
Paper Code: RJSUZOO403			
UNIT I		15	
Parasitology			
1	1.1 Definitions: parasite, parasitism, host, vector-biological and mechanical. 1.2 Types of parasites- Ectoparasites, Endoparasite and their subtypes 1.3 Parasitic adaptations in Ectoparasites and Endoparasites 1.4 Types of hosts: intermediate, definitive and reservoir 1.5 Host-parasite relationship Host specificity: Definition, structural specificity, physiological specificity and ecological specificity. 1.6 Protozoan and helminth parasites of man and domesticated animals: Life cycle, pathogenicity, control measures and treatment of; a) <i>Entamoeba histolytica</i> , b) <i>Leishmania</i> , c) <i>Toxoplasma gondii</i> , d) <i>Fasciola hepatica</i> , e) <i>Taenia solium</i>		
UNIT II		15	
Animal Husbandry			
2	2.1 Introduction: concept of integrated farming. 2.2 Poultry: 2.2.1 Definition and nomenclature. 2.2.2 Breeds of fowl (Aseel, Kadaknath, Leghorn, Rhode Island red), 2.2.3 Factors affecting size of eggs, abnormal eggs, hatching of eggs, 2.2.4 Housing and equipments, Brooding and rearing. 2.2.5 Poultry diseases- Coccidiosis, Avian flu. 2.3 Cattle Farming: 2.3.1 Classification of breeds (Milch breeds, Dual Purpose Breeds, Draught breeds, New breeds). 2.3.2 Various breeds of Cows: Indigenous – Red Sindhi, Sahiwal, Khillari, Hariana. Exotic – Holstein–Friesian, Brown Swiss, Jersey. 2.3.3 Various breeds of Buffalo: Murrah, Nagpuri, Jaffrabadi. 2.3.4 Dairy Science: Composition of Milk, Methods of Preservation of Milk Products.		
UNIT III		15	
Behavioral Ethology			
3	3.1 Concept of instincts: Innate release mechanism, significance of instincts. 3.2 Concepts of imprinting: Filial imprinting, sexual imprinting, Functional aspects of imprinting. 3.3 Displacement behaviour: Causes and functional aspects, ritualization of displacement activity. 3.4 Animal communication: Visual, Sound, Chemical (pheromones), Round & Waggle dance in bees.		

S.Y.B.Sc	Semester IV Theory
<p>RJSUZOO403</p> <p>Paper- III</p> <p>Parasitology, Animal Husbandry And Behavioural Ethology</p>	<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To introduce key concept of parasitology. 2. To introduce the learner to the concepts of animal farming. 3. To familiarize learner with concept animal behaviour. <p>Learning Outcomes:</p> <ol style="list-style-type: none"> 1. Learners would appreciate the importance of parasite, their relation with host and life cycle. 2. Learners would able to understand concept of types and methodology of animal farming with economic value. 3. Learners would understand different aspects of animal behaviour with special emphasis on imprinting, communication and displacement behaviour.

SEMESTER-III (PRACTICALS)		L	Cr
Practical I- Type Study, Life Processes And Developmental Biology Paper Code: RJSUZOOP301			1
1. Study of earthworm			
a. External characters			
b. Digestive system			
c. Nervous system (Demonstration)			
d. Reproductive system (Demonstration)			
e. Mounting- Septal nephridia, spermatheca, setae.			
2. Urine analysis—Normal and abnormal constituents.			
3. Detection of ammonia in water excreted by fish.			
4. Detection of uric acid from excreta of birds.			
5. Study of nutritional Apparatus (<i>Amoeba</i> , <i>Hydra</i> , <i>Amphioxus</i> , Pigeon, Ruminant stomach)			
6. Study of respiratory structures: Gills of Bony fish and Cartilaginous fish, Lungs of frog, Lungs of mammal, Air sacs of Pigeon.			
7. Study of permanent slides on topic of Reproduction: <i>Paramoecium</i> - Binary fission and conjugation, Sponge gemmules, <i>Hydra</i> budding, T.S. of mammalian testis, T.S. of mammalian ovary.			
8. Study of Egg types –Fish eggs, Frog eggs, Hen's egg.			
9. Study of Cleavage, blastula and gastrula (<i>Amphioxus</i> , Frog and Bird).			
Practical II - Biochemistry, Genetics And Molecular Biology Paper Code: RJSUZOOP302			1
1. Preparation of buffer of different pH using Henderson-Hasselbalch equation			
2. Preparation of titration curve for strong acid and strong base with the help of pH meter			
3. Determination of pKa for weak acid			
4. Colorimetry:			
a) Selection of ideal filters			
b) Determination of unknown concentration.			
5. Study of drosophila: Phenotypic traits (eye colour, wing length, sexual dimorphism, gynandromorphs)			
6. Problems in Genetics-monohybrid cross, dihybrid cross, multiple allelism.			
7. Blood grouping			
8. Problems based on molecular biology.			

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	Practical III - Ecology, Fishery Biology And Economic Entomology Paper Code: RJSUZOO303		1
	1. Study of different ecosystems (biomes) and their representative animals.		
	2. Study of commercially important fishery a. Fin fish fishery- Catla, Rohu, Mackerel, Pomfret, Bombay duck b. Non-fin fish fishery- Prawn, Crab, Lobster, Edible oyster)		
	3. Study of crafts and gears.		
	4. Study of honey bee: a) Life cycle of honey bee b) Study of bee hive. c) Mouth parts, d) Legs of honeybee e) Sting apparatus,		
	5. Life cycle of Silk Moth		
	6. Detection of adulterants in honey		
	7. Study of Insects a. Harmful insect :Locust, Aphids, Rice weevil b. Entomophagus insect – Dragonfly c. Parasite Insect – Ichneumon wasp.		
	8. Visit to fish market/docks/fish landing centers and submission of report.		

S.Y.B.Sc	Semester III Practical
RJSUZOO301 Practical- I	Course Objectives: <ol style="list-style-type: none"> To familiarize the learner to understand various system of invertebrate To make the learner understand different organ involved in different physiological mechanism Learning Outcomes: <ol style="list-style-type: none"> The learner will be able to apply the knowledge of different biochemical test to detect excretory product. The learner can able to make histological analysis by studying the specimen and slides

S.Y.B.Sc	Semester III Practical
RJSUZOO302 Practical- II	<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To make the learner understand preparation of buffer and other chemical solution. 2. To understand the application of genetics by observation of morphological characteristic of drosophila 3. Introduction to study of some laboratory techniques. <p>Learning Outcomes:</p> <ol style="list-style-type: none"> 1. Learners will get an idea about type of solution and also get hands on training on colorimeter. 2. Learners will be able to understand mathematical approach and probability to solve problems based on genetics.

S.Y.B.Sc	Semester III Practical
RJSUZOO303 Practical- III	<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To introduce the concept of biomes by introducing different animal by observing specimen. 2. To introduce commercially important fishery by observing different specimen of fish 3. To familiarize the learner to economically important insect with practical involving observation of specimen in the laboratory as well as on field study. <p>Learning Outcomes:</p> <ol style="list-style-type: none"> 1. Learners will able to apply knowledge of biomes on field. 2. Learners will be able to identify different types of fish and economically Important insect on field.

SEMESTER-IV(PRACTICALS)		L	Cr
Practical I Types Study, Life Processes And Cell Biology Paper Code: RJSUZOOP401			1
1. Study of cockroach			
a) External characters			
b) Digestive system			
c) Nervous system (Demonstration)			
d) Reproductive system (Demonstration)			
e) Mounting- ommatidia, mouth parts, trachea & spiracles.			
2. Study of hearts (Cockroach, Shark, Frog, Calotes, Crocodile, Mammal)			
3. Study of locomotory organs (Amoeba, Cockroach, Unio, Starfish, Fish, and Birds)			
4. Study of striated and non- striated muscle fibre			
5. Ultra structure of cell organelles – (Electron micrographs)			
a.Nucleus			
b.Endoplasmic reticulum (Smooth and rough)			
c.Mitochondria.			
d.Golgi apparatus			
e.Lysosomes			
6. Study of permeability of cell through plasma membrane (Osmosis in blood cells).			
7. Mounting of Polytene chromosome.			
Practical II Biochemistry, Chromosomal Inheritance And Cell Biology Paper Code: RJSUZOOP402			1
1. Estimation of creatinine from serum/urine sample.			
2. Estimation on serum cholesterol.			
3. Study of mitosis (onion root tip)			
4. Mounting of Barr body			
5. Problems based on genetics-X-linked inheritance.			
6. Pedigree analysis(X-linked- dominant, recessive), Autosomal (dominant, recessive).			
7. Study of fossils-Trilobite, Ammonite, Archaeopteryx.			
8. Study of evidences of evolution:			
a. Analogy – Leg of grasshopper and leg of mammal, Wing of insect and wing of bird.			
b. Homology - Fore limb of amphibian and Fore limb of reptile, Wing of bird and forelimb of man.			

	Practical III Parasitology, Animal Husbandry And Behavioural Ethology Paper Code: RJSUZOOP403		1
	<ol style="list-style-type: none"> Study of endoparasites <ol style="list-style-type: none"> Protozoan parasites- <i>Trypanosoma gambiense</i>, <i>Entamoeba histolytica</i> Helminth parasites- <i>Ancylostoma duodenale</i>, <i>Taenia solium</i> Study of Ectoparasites: Leech, Tick, Mite Poultry – Aseel, Kadaknath, Leghorn, Rhode island red Cattle breeds- <ol style="list-style-type: none"> Cow breeds-Indigenous: Red Sindhi and Sahiwal. Exotic: Jersey, Holstein Friesian, Buffalo breeds- Murrah, Nagpuri and Jaffrabadi Quantitative estimation of proteins from eggs. Extraction and qualitative test of casein from milk. Measurement of density of milk samples by Lactometer. Detection of milk adulterants: starch, urea, glucose. To evaluate the quality of milk by methylene blue reduction method. Study of ethological aspects: <ol style="list-style-type: none"> Instincts Imprinting Communication in animals: Chemical signals and sound signals Displacement activities in animals: Courtship and mating behavior in animals and ritualization. Field visit to a natural ecosystem/dairy industry/apiary/sericulture unit and report submission 		

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S.Y.B.Sc	Semester IV Practical
RJSUZOO401 Practical- I	Course Objectives: <ol style="list-style-type: none"> 1. To familiarize the learner to understand various system of invertebrate 2. To make the learner understand different organ involved in different physiological mechanism. 3. To make the learner observe different cell organelles using permanent slide or microphotograph. Learning Outcomes: <ol style="list-style-type: none"> 1. The learner will be able to explore different system of invertebrate. 2. The learner can able to make histological analysis by studying the specimen and slides. 3. Learner can able to observe and study permeability of membrane and polytene chromosome by mounting on slide.

S.Y.B.Sc	Semester IV Practical
RJSUZOO402 Practical- II	Course Objectives: <ol style="list-style-type: none"> 1. Introduction of study of laboratory technique and diagnostic test. 2. To familiarize learner to evolution with practical involving observation of specimen in the laboratory. Learning Outcomes: <ol style="list-style-type: none"> 1. The learner will be able to use instrument and kits for clinical diagnostics in pathology laboratory 2. The learner can able to study cell division for different research purpose

S.Y.B.Sc	Semester IV Practical
RJSUZOO403 Practical- III	Course Objectives: <ol style="list-style-type: none"> 1. Introduction of study of laboratory technique and diagnostic test useful for animal farming. 2. To familiarize learner to parasitology with practical involving observation of specimen in the laboratory. Learning Outcomes: <ol style="list-style-type: none"> 1. The learner will be able to use instrument and technique for diagnosis of milk product and adulterants. 2. The learner can able to identify and select different breeds for animal farming.

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S.Y.B.Sc Zoology Syllabus Semester III & IV

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SCHEME OF EXAMINATION (FOR BOTH SEMESTERS)

Internal examination

The first internal class test comprising of 20 marks shall consist of 20 multiple choice questions with equal weightage.

The second class test will comprise of three short notes- one from each unit of 4 marks each and eight questions of one mark each from all units.

External theory paper pattern

Total: 60 marks

Q.1 Based on Unit I..... 15M

a. 8 M

b. 7 M

OR

a. 5 M

b. 5M

c. 5M

Q.2 Based on Unit II.....15M

a. 8 M

b. 7 M

OR

a. 5 M

b. 5M

c. 5M

Q.3 Based on Unit III.....15M

a. 8 M

b. 7 M

OR

a. 5 M

b. 5M

c. 5M

Q.4 Short notes (mixed on all units).....15M (5marks each)

a or a (Unit I)

b or b (Unit II)

c or c (Unit III)

EVALUATION AND ASSESSMENT:**QUESTION PAPER FOR PRACTICAL EXAMINATION****SEMESTER III****PRACTICAL I**

Total marks: 50

Q.1 Major experiment	12M
Urine analysis/ Dissection of earthworm digestive system	
Q.2 Minor experiment	08M
Detection of ammonia/uric acid	
Q.3 Mounting of septal nephridium/setae/spermatheca (any one)	05M
Q.4 Identify and describe	15M
a. One specimen from nutritional apparatus	
b. One specimen from respiratory structures	
c. One specimen from reproductive structures	
d& e. specimens from types of eggs, cleavage, blastula & gastrula	
Q.5 Viva	05M
Q.6 Journal	05M

PRACTICAL II

Total marks: 50

Q.1 Major experiment	12M
(Titration curve/pKa/Determination of unknown concentration)	
Q.2 Minor experiment	08M
(Preparation of buffer/Blood grouping/ Selection of ideal filter)	
Q.3 Identification (any one Phenotypic trait of Drosophila)	05M
Q.4 a. Problems based on genetics (two problems)	08M
b. Problem based on molecular biology	07M
Q.5 Viva	05M
Q.6 Journal	05M

PRACTICAL III

Total marks: 50

Q.1 Major experiment	12M
Detection of honey adulterants	
Q.2 Mountings of honey bee (Legs/mouth parts/Sting apparatus)	05M
Q.3 Identification	18M
a. One animal from ecosystem (biome) study	
b. One specimen from fin fish fishery	
c. One specimen from non-fin fish fishery	
d. One specimen from craft/gear	
e. Life cycle of silk moth/honey bee/ structure of beehive	
f. One specimen from economic entomology	
Q.4 Report on fish market visit.	05M
Q.5 Viva	05M
Q.6 Journal	05M

QUESTION PAPER FOR PRACTICAL EXAMINATION**SEMESTER IV****PRACTICAL I**

Total marks: 50

Q.1 Major experiment	12M
(Osmosis/Polytene chromosome/Digestive system of cockroach)	
Q.2 Minor experiment	08M
(Mountings of cockroach- Spiracles/ cornea/ mouth parts)	
Q.3 Identification	15M
a. One specimen from study of hearts	
b& c. Specimens from locomotary organs and muscles	
d& e. Electron micrographs of cell organelles	
Q.4 Viva	05M
Q.5 Journal	05M

PRACTICAL II

Total marks: 50

Q.1 Major experiment	12M
Estimation of creatinine/cholesterol	
Q.2 a. Problem based on genetics.	06M
b. Problem based on pedigree analysis	05M
Q.3 Minor experiment	08M
Mitosis/ Barr body mounting	
Q.4 Identification based on evidences of evolution	09M
a, b and c (fossils, homology & analogy)	
Q.5 Viva	05M
Q.6 Journal	05M

PRACTICAL III

Total marks: 50

Q.1 Major experiment	12M
Estimation of protein/milk adulterants	
Q.2 Minor experiment	08M
Extraction of casein/MBRT/Lactometer	
Q.3 Identification	12M
a. One example from Protozoan/Helminth parasite	
b. One example from ectoparasites	
c. One example of poultry breed	
d. One example of cattle/buffalo breed	
e& f. examples from ethology	
Q.4 Report on field visit.	08M
Q.5 Viva	05M
Q.6 Journal	05M