A. C. 10/2/2012

Item No. 4.17

UNIVERSITY OF MUMBAI

Syllabus for the S.Y.B.Sc.
Program: B.Sc.
Course: Zoology

(Credit Based Semester and Grading System with effect from the academic year 2012–2013)

S. Y. B. Sc. - Zoology Syllabus

Credit Based Semester Grading System

To be implemented from the Academic year 2012-2013

SEMESTER III

Course Code	UNIT	TOPICS	Credits	L / Week
USZO 301	I	Unicellular, Multicellular Acoelomate life	2	**1**
	II	Developmental Biology		**1**
	III	Ecology		**1**
USZO 302	I	Biochemistry	2	**1**
	II	Molecular Biology		**1**
	III	Genetics		**1**
USZO 303	I	Introduction to Parasitology and Protozoan Parasites	2	**1**
	II	Economic Entomology		**1**
	III	Animal Farming- I		**1**
		Total Credits for Theory	**6**	**09 L/W**
USZO P 3		**Practical based on Courses in Theory [Per Course = 01 Credit]**	**3**	
		Total Credits [Theory + Practical]	**9**	

Course Code: USZO 301

Animal Kingdom [Invertebrate Life], Developmental Biology And Ecology

Semester III

Unit I : Wonders of the Animal Kingdom **15 Lectures**

1.1 **Unicellular, Multicellular and Acoelomate life**:

1.1.1 Protozoa : Skeleton and Reproduction

1.1.2 Porifera : Canal Systems, Spicules and Reproduction

1.1.3 Coelenterata: Polymorphism, Types and theories of formation of coral reefs.

1.1.4 Helminthes: Parasitic adaptations in Helminthes.

1.2 Coelomate Life:

1.2.1 Annelida : Reproduction

1.2.2 Arthropoda: Crustacean Larvae and Metamorphosis in insects.

1.2.3 Mollusca: Shell and Torsion

1.2.4 Echinodermata: Water Vascular System and Larvae.

Unit II : Developmental Biology **15 Lectures**

2.1.1 **Fertilization** and Parthenogenesis

2.1.2 **Eggs and Cleavage**

A] Types of Eggs

B] Types of Cleavage

2.1.3 **Types of Blastulae**: Amphibia, Bird and Mammal

2.1.4 **Gastrulation**

Epiboly, Emboly, Invagination, Involution and Infiltration

2.1.5 **Fate** of three Germinal Layers and Coelome formation

Unit III: Ecology **15 Lectures**

3.1.1 **Ecosystem:** Concept of Ecosystem, Major and Minor ecosystems, Natural and Artificial Ecosystems

3.1.2 **Abiotic Factors**:

A] Edaphic: Components of Soil and Soil Profile

B] Climatic: Light, Temperature and Precipitation

C] Topographic

3.1.3 **Major Natural Ecosystems:**

A] Marine

B] Fresh Water

C] Terrestrial: Forest, Grassland and desert Biomes

3.1.4 **Population Ecology:**

A] Concept of Dynamic Nature

B] Factors influencing Population dynamics: Natality, Mortality, Survivorship Curves, Migration, Density, Age structure and Sex ratio.

3.1.5 **Community Ecology**: Concept of Ecological Niche and Ecological Succession.

Course Code USZOP-3 [301]

Animal Kingdom, Developmental Biology & Ecology

Sr. No.	Title of the Experiment
1	Mounting of foraminiferan shells from sand
2	Observation of Binary fission and Conjugation in Paramoecium [Permanent Slides]
3	Observation of V. S. of Grantia and L. S. of Leucosolenia
4	Observation of Polymorphism : Obelia Colony and medusa, Physalia, Vellela, Porpita
5	Observation of Corals: Fungia, Madrepora, Meandrina [Brain Coral], Tubipora and Sea Fan.
6	Observation of Liverfluke T. S. and its Larvae
7	Observation of Heteronereis and Trochophore Larva

8	Study of Crustacean Larvae : Nauplius, Cypris, Zoea, Megalopa, Alima, Mysis and Phyllosoma
9	**Study of Metamorphosis in insect:**
	a) Juvenile and adult of Lepisma
	b) Life history of…
	i) House fly
	ii) Mosquito(Culex or Anopheles)
	iii) Beetle
	iv) Butterfly
10	**Study of shells in Mollusca :** Chiton, Dentalium, Trochus, Placuna, Solen, Sepia, Nautilus, Sinistral and Dextral Shells
11	**Study of Echinoderm larvae** : Bipinnaria, Ohiopleuteus, Echinopleuteus, Auricularia, Doliolaria
12	**Embryology:**
	A] Study of different types of eggs : Isolecithal, Mesolecithal, Telolecithal
	B] Study of blastulae : Amphioxus, Frog, Mammal
	C] Study of Gastrulae : a] Frog, Primitive streak, b] Section of primitive streak of chick embryo
13	**Ecology :**
	a] Qualitative estimation of free carbon dioxide in water
	b] Qualitative estimation of DO of water
	c] Qualitative estimation of Salinity in water
	d] Determination of total Hardness of water
	e] Determination of Moisture content of soil
	f] Determination of pH of soil
	g] Qualitative estimation of Phosphate phosphorous
	h] Determination of Texture of soil (coarse and fine)

Course code: USZO - 302

Title of the Paper- Biochemistry, Molecular Biology and Genetics.

Unit- I: Biochemistry **15 Lectures**

1.1 Water : The Basic Molecule Of Life

1.1.1 Molecular structure of Water: Tetrahedral Geometry, Hydrogen bond and flickering clusters, Macromolecular association.

1.1.2 Physical and Chemical Properties of Water: Density, Specific heat, Heat of Vapourization, Heat of Fusion, Surface Tension. Hydrogen bonds with solutes. Interaction with Non-polar compounds. Water as a reactant.

1.1.3 Ionization of water, K_w ion product of water, pH scale
Dissociation of Weak acids and Weak bases, pK_a, Henderson- Hasselbalch equation. Titration curves of Weak acids, Buffers in Biological Systems.

1.2 Metabolism

1.2.1 An Overview of Metabolism:
Thermodynamics: Concepts of Entropy, Negentropy and Enthalpy
Intermediary metabolism, how major Anabolic and Catabolic pathways are interconnected. Acetyl – CoA as a common product in metabolism of Carbohydrates, Proteins and Lipids.

1.2.2 Carbohydrate Metabolism.
a] Significant pathways of Carbohydrate Metabolism-an overview
b] Glycolysis and TCA cycle – Reactions, Enzymes. Anaerobic pathway.
c] Electron transport and Oxidative Phosphorylation.

1.2.3. Lipid Metabolism: Overview, Triacylglycerol, β- Oxidation.

1.2.4. Protein Metabolism: Overview, Amino acid pool, essential and non-essential amino acids. Metabolism of amino acids- Transamination, Deamination (Oxidative and Non-oxidative)

Unit II: Molecular Biology **15 Lectures**

2.1 Biosynthesis of DNA- Semiconservative method

2.2 Transcription in Prokaryotes:
Initiation, Elongation, Termination of m- RNA, *E. Coli* RNA polymerase.

2.3 Transcription in Eukaryotes: Initiation, Elongation and Termination of m- RNA. RNA polymerase of Eukaryotes. Difference in Transcription in Prokaryotes and Eukaryotes.

2.4. Translation:
a) Genetic Code: Properties, Features and 'Wobble hypothesis.'
b) Structure and Chemical Composition of Prokaryotic and Eukaryotic Ribosome.
c) Aminoacylation of t-RNA, Activation of t- RNA. Recognition of t- RNA
d) Translation in Prokaryotes, Initiation of Protein Synthesis, Chain Elongation and Chain Termination.
e) Translation in Eukaryotes

Unit - III Genetics **15 L**

3.1 Sex determination

3.1.1. Methods of sex determination

Environmental Chromosomal- Haploid, XX, XO, XX-XY and ZZ- ZW. Genic Balance Theory of sex determination in Drosophila, Lyon's Hypothesis of X chromosome inactivation.

3.1.2 Inheritance related to Sex:

X Linked, Y linked and Z linked with suitable examples Sex limited and Sex influenced Genes

3.2. Multiple Alleles:

Concept, definition, characters and symbolism, coat colour in rabbit, eye colour and Vestigial wing alleles in Drosophila, A and B blood group and Rh factor in human.

3.3 Quantitative or Polygenic Inheritance

Concept and definition, Skin colour, Eye colour and Height in Human, Milk gene in Cow, Meat gene in Poultry.

3.4 Linkage and Crossing Over:

a) Concept of linkage, Coupling and Repulsion hypothesis. Linkage groups, Complete and Incomplete linkages

b) Concept of Crossing Over, Cytological evidence of Crossing Over, Mechanism and Types of Crossing Over, Factors affecting Crossing Over and Significance of Crossing Over.

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Course Code: USZOP-3 [302]

Biochemistry, Molecular Biology and Genetics

Sr. No.	Title of the Experiment
1	Study of pH meter: Principle and Working.
2	Preparation of buffer of different pH using Henderson-Hasselbalch equation
3	Preparation of titration curve for strong acid and strong base with the help of pH meter
4	Determination of pKa for weak acid
5	Study of Colorimeter: Principle and working
	a] Principle and working
	b] Selection and filters

	c] Determination of concentration using colorimeter
6	Estimation of the Blood glucose level using glucometer and using glucose estimation kit [GOD/POD method]
7	Mounting of Barr Body
8	Problems in Genetics
9	Problems in Molecular Biology

Course Code USZO 303

Applied and Economic Zoology

Unit I : Introduction to Parasitology and Protozoan Parasites 15 Lectures

1.3 Types of Parasites and Hosts

1.3.1 Parasites (Ectoparasites, Endoparasites, Monogenetic, Digenetic, Temporary, Permanent, Extracellular Parasites, Intracellular Parasites, Facultative, Accidental)

1.3.2 Host (Definitive, Intermediate, Paratenic, Reservoir)

1.4 Protozoan Parasites:

1.4.1 Morphology, Mode of Infection, Life Cycle, Pathogenecity, Prophylaxis and Treatment of *Entamoeba histolytica*, *Plasmodium vivax*, *Trypanosoma gambeinse* and *Lieshmania donovani*.

Unit II Economic Entomology 15 Lectures

2.1 Honey bee: Social life and communication, life history, Apiculture, Economic Importance

2.2 Lac culture: life cycle, lac culture, composition, and uses of lac.

2.3 Silk moth: Life history, Sericulture, Economic Importance

2.4 Life history and control measures of *Schistocera gregaria*, Aphids, *Sitophilus oryzae*, *Tribolium confusum*.

2.5 Methods of insect control

2.5.1 Chemical control by synthetic and natural chemicals.

2.5.2 Biological control

1. *Bacillus thureingensis*
2. Entomophagus insects
3. Parasitic insects

Unit III: Animal Farming 15 Lectures

3.1 Introduction: concept of integrated farming. Present status and future of Animal farming in India.

3.2 Poultry: Definition, nomenclature and breeds of fowl, factors affecting size of eggs, abnormal eggs, hatching of eggs, housing and equipments, Brooding and rearing, raising boilers Poultry diseases- Coccidiosis, Avian flu.

3.3 Goat farming

Importance of goat farming
Indigenous breeds- Jamanapari, Beetal, Honberi, Black Bengal
Exotic breed - Toggenberg, Nubia.
Nutrition, Prevention and Treatment of diseases.
Recent techniques to improve production.

Course Code: USZOP- 3 [303]

Applied and Economic Zoology

Sr. No.	Title of the Experiment
1	Study of Protozoan Parasites… Types – Identification of Entamoeba, Plasmodium, Trypanosoma, Leishmania.
2	Economic entomology… Life cycle of honey bee and bee hive.
3	Mountings of honeybee – **1.** Mouth parts, Legs of honeybee **2.** Sting apparatus,
4	Life cycle of Silk Moth
5	Study of Insects **I.** Harmful insect – **1.** Locus/ Grasshopper **2.** Aphids **3.** Rice weevil **4.** Flour beetle **II.** Entomophagus insect – Dragonfly **III.** Parasite Insect – Ichneumon wasp.
6	Animal husbandry **1.** Poultry – Layers (Leghorn), Broiler **2.** Goat – Jamnapuri, Surti
7	Colorimetric estimation of protein in two different varieties of hen eggs (Country/ Farm) – Biuret or Folin – Lowry method (Std. graph to be provided or Concentration of the Std. to be given).
8	Colorimetric estimation of total lipids in the yolk of two different varieties of hen eggs (Country/ Farm) – $FeCl_3$ method. (Std. graph to be provided or Concentration of the Std. to be given)

SEMESTER IV

Course Code	UNIT	TOPICS	Credits	L / Week
USZO 401	I	Chordate life	**2**	**1**
	II	Cellular organization		**1**
	III	Ethology		**1**
USZO 402	I	Biotechnology	**2**	**1**
	II	Applied Biotechnology and Bioinformatics		**1**
	III	Evolution		**1**
USZO 403	I	Heliminth parasitology	**2**	**1**
	II	Fisheries		**1**
	III	Animal Farming- II		**1**
		Total Credits for theory	**6**	**09 L/W**
USZO P - 4	**Practical based on courses in theory [Per Course = 01 Credit]**		**3**	
	Total Credits [Theory + Practical]		**9**	

Course Code: USZO 401
Animal Kingdom [Chordates], Cellular Organization and Ethology

Unit I : Chordate Life **15 Lectures**

1.1 Protochordates: Retrogressive metamorphosis in Ascidians
1.2 Vertebrate Life
1.2.1 Swim Bladder, Breeding and Parental Care in fishes
1.2.2 Neoteny and Parental care in Amphibians
1.2.3 Adaptive radiations in reptiles
1.2.4 Venomous and Non-Venomous snakes
1.2.5 Migration in Birds
1.2.6 Egg laying mammals and marsupials
1.2.7 Aquatic Mammals

Unit II : Cellular Organization **15 Lectures**

2.1.1 Structure and function of Plasma membrane
Importance of membrane fluidity and asymmetry, Membrane Transport, Passive diffusion, facilitated transport, active transport, Exocytosis and Endocytosis.
2.1.2 Cytoplasmic Membrane System: Structure and function
A] Endoplasmic Reticulum: SER, RER
B] Golgi Complex
C] Lysosomes: Primary and Secondary Lysosomes
2.1.3 Mitochondria
Structural Organization, Chemical Energy and ATP, Krebs cycle, Electron Transport and Oxidative Phosphorylation.
2.1.4 Structure of nucleus and nucleolus
Nuclear Pore and pore Complex, Nucleolus, Organization of Chromatin

And chromosomes, Polytene and lamp brush chromosomes

Unit III: Ethology **15 Lectures**

3.1 Concept of Instinct, Innate Release Mechanism and Fixed Action Pattern, Significance of Instincts

3.2 Concepts of imprinting: Long term and functional aspect of Imprinting

3.3 Displacement behavior: Causes and functional aspects, Ritualization of Displacement activities.

3.4 Animal Communication: Components necessary for Communication, Signals: Chemical, Light and Sound, Language of Communication in Bees and Primates, Concept of Interception and Deception.

Course Code: USZOP- 4 [401]
Animal Kingdom, Cellular Organization & Ethology.

Sr. No.	Title of the Experiment
1	Study of Ascidian tadpole (retrogressive metamorphosis)
2	Study of swim bladder (*in situ*)
3	**Parental Care and Breeding…..** Sea horse, Gouramy, Siamese fighter, Cat fish, Tilapia, Caecilian, Midwife toad, Neoteny (axolotl larvae)
4	**Adaptive radiation in reptiles :** Turtle, Tortoise, Chameleon, Phrynosoma, Wall lizard, Rat Snake, Sea Snake, Crocodile or Gharial
5	**Study of venomous snakes** : Krait, Cobra, Russell's viper, Saw scaled viper, Jaw of Venomous Snake
6	**Study of Adaptive radiations in Mammals :** Duck billed Platypus, Kangaroo, Bottle nose dolphin, Blue whale, Sea Cow [Dugong]
7	Study of Osmosis using RBCs by…. i]Test Tube Method ii] Cavity Slide Method
8	Study of ultra structure of Cell Organelles using electron micrograph- Mitochondria, Endoplasmic reticulum, Golgi complex, Nucleus and Lysosomes
9	Study of Chromosome morphology using Onion root tip-squash preparation
10	Study of Polytene Chromosome: Temporary preparation of Salivary

	gland of Chironomous larva/ drosophila/mosquito.
11	Two Examples of each type [for Identification only]
	a] Warning Colouration
	B] Mimicry
	c] Instinct
	d] Imprinting
	e] **Communication in Animals :** Chemical Signals, Light Signals, Communication Language in Bees
	f] **Displacement Activities in animals :** Courtship and Mating behavior in animals, Ritualization

Course code: USZO 402

Biotechnology, Applied Biotechnology, Bioinformatics and Evolution

Unit I: Biotechnology **15 L**

1.1 Tools in Recombinant DNA Technology

1.1.1 Molecular tools:

a) Restriction Enzymes

b) DNA ligases

1.1.2 Cells and Organisms as Tools for Recombinant DNA Technology:

a) Requirement for growth of cells in culture- Brief idea

b) Properties and types of Vectors – plasmids (pBR 322) Bacteriophage and Cosmid vectors.

1.1.3 Gene Libraries and Construction of Gene Library.

a) Selection, screening and preparation of donor genetic material.

1. DNA labeling and probe production
2. Obtaining intact c- DNA

b) Construction of donor DNA- cloning vector recombinant molecule.

1. Direct insertion of donor DNA (gene) into Vector through Restriction Homology
2. Insertion of gene into a plasmid by using Linker molecule, Adaptor molecule and Homo-polymer tailing.

c) Insertion of recombinant molecule into host cell (cloning strategy)

1. Cloning in bacterial cell (Somatostatin gene insertion)
2. Cloning in animal cell (Interferon gene insertion)

Unit II - Commercial Biotechnology and Bioinformatics: **15 L**

2.1 Applied Biotechnology:

Applications of biotechnology in…

a) Agriculture- Golden rice, Herbicide resistance, Nitrogen fixation, Bt toxin
b) Therapeutics: Hepatitis B vaccine, Stem Cell therapy
c) Environment: Use of microbes in Bioremediation of Heavy Metals and Plastics

2.2: Bioinformatics:

a) Introduction and Scope
b) Concept of information network: Internet, Ip address, TCP/IP, FTP, HTTP, HTML and URLs
c) Genomics: DNA sequencing by Sanger's Method Genome projects
d) Introduction to human Genome project.
e) Introduction to proteomics: Protein conformation, Protein sequencing and analysis, DNA alphabet, Extended DNA alphabet (IUB- IUPAC), Base ambiguity symbols, Single letter amino acid code. Pattern recognition and prediction, Homologous, Analogous, orthologous and paralogous sequences.
f) Virtual Libraries (Concept of Database and Application): The European Molecular Biology, Net work- EMBnet, The National Center for biotechnology- NCBI

Unit III: Evolution **15 L**

3.2.1 Genetic Basis of Evolution: Reproduction, Significance of Meiosis
Population Genetics: Gene Pool, Gene Frequencies, Hardy-Weinberg equilibrium
3.2.2 Variations as Raw Material for Evolution
Types of Variations, Mutation and Recombination
3.2.3 Elemental forces of Evolution: Migration (Gene Flow), Mutation, Natural Selection and Genetic Drift.
3.2.4 Speciation: Allopatric and Sympatric speciation, Isolating Mechanisms, Types of Isolation
3.2.5. Concept of Macro and Mega evolution.

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Course Code: USZOP- 4 [402]

Sr. No.		Title of the Experiment
1		Internet connectivity, search engines, visits to bioinformatics and related sites.
2		**Problems based on Biotechnology…**
	I	Restriction Enzyme, Recognition sites and resultant fragments from DNA Sequences provided.
	II	Identification of genes and restriction sites on plasmid maps [pBR 322, PUC etc.]
3		**Evolution**
	I	Types of Variations
	II	Sympatric and Allopatric Speciation
	III	Isolating Mechanisms

Course Code: USZO 403
Applied and Economic Zoology

Unit I Helminthes Parasitology **15 Lectures**

1.1 Morphology, mode of infection, life cycle, Pathogenecity, prophylaxis and Treatment of Helminthes…..

Taenia solium, Enterobius vermicularis, Anclylostoma duodenale, Wucheria bancrofti, Dracunculus medinensis.

Unit II Fisheries **15 Lectures**

2.1 Types of Fisheries (Marine: Coastal, Offshore and deep Sea fisheries, Brackish Water, Fresh water, Culture fisheries with emphasis on locally important species)

2.2 Important Capture Fisheries of India

- 2.2.1 Fin- fish: Oil sardine, mackerel, Bombay duck, Pomfret and Shark
- 2.2.2 Crustacean fisheries: Prawns, crabs and lobsters
- 2.2.3 Molluscan fisheries: Edible and pearl oyster, process of pearl formation.

2.3 Fish preservation

- 2.3.1 Principles of Preservation
- 2.3.2 Methods of Preservation

2.4 Fish products

2.5 Crafts and gears used on Indian Coasts.

- 2.5.1 Crafts: Dugout, Outrigger, Catamaran, Musula, Satpati, Trawler.
- 2.5.2 Gears: Gill and drift net, Dol net, Cast net, Purse seine, Shore Seine, Long line.

Unit III Animal farming **15 Lectures**

3.1 Sheep farming

- 3.1.1 Common terms in and advantages of sheep farming
- 3.1.2 Various breed of sheep: Indigenous – Chokla, Nial
  Exotic – Rambouillet, Dorset
- 3.1.3 Preparing the ewe for breeding and mating system of mating.
- 3.1.4 Controlling heat, sign of pregnancy, lambing, raising lamb
- 3.1.5 Feeding of ewe flock.
- 3.1.6 Determining the age of Sheep by their teeth.

3.2 Cattle Farming

- 3.2.1 Classification of breeds – Milch breeds, Dual Purpose Breeds, Draught breeds, New breeds.
- 3.2.2 Various breeds of Cows:
  Indigenous – Red Sindhi, Sahiwal, Khillari, Jercy, Hariyana.
  Exotic – Holstein– Friesian, Brown Swiss
- 3.2.3 Various breeds of Buffalo:

Murrah, Nagpuri, Jaffrabadi, Bhadwari

3.2.4 Breeding and Management of Buffaloes

3.3 Dairy Science: Composition of Milk, Methods of Preservation of Milk Products.

3.4 Vermiculture

Course Code: USZOP – 4 [403]

Applied and Economic Zoology

Sr. No.	Title of the Experiment
1	Study of Helminthes Parasites **I.** Types – Identification of Taenia, Enterobius, Ancyclostoma, Wuchereria and Dracunculus. **II.** Parasitic adaptation – Scolex & Mature Proglottid of Tapeworm.
2	Study of Morphological Characters of a fish… **a.** Shape of the body and body compression **b.** Total length and Standard length **c.** Body Colouration **d.** Position of the Mouth and Jaw suspension [Teeth] **e.** Pelagic or Benthic **f.** Fins **g.** Spines and rays Following **Examples** to be studied with reference to above points: Pomfret, Shark, Sting Ray, Bombay duck and Mackerel
3	Study of Fishery – Identification of the specimen with special reference to Fishery… I. Fresh water fishery – Rohu, Catla, Mrigal. II. Marine water fishery – **a.** Oil sardine, mackerel, Bombay duck, Pomfret and Shark **b.** Study of Crustacean fisheries & Molluscan fisheries: Prawns/ Shrimps, Lobsters, Crabs, Edible/ pearl oyster, Sepia, Loligo, Katelysia, Mytilus
4	Identification and Uses of Crafts and Gears… **a.** Crafts: Dugout, Outrigger, Catamaran, Musula, Satpati, Trawler. **b.** Gears: Gill net, Dol net, Cast net, Purse seine, Shore seine, Long line.
5	**Animal husbandry -** Animal types to be studied… **a.** Cattle – Milk breeds – Sahiwal **b.** Dual purpose breeds – Hariyana **c.** Draught purpose – Khillari **d.** Sheep – Gaddi, Marvari. **e.** Buffalo – Murrah, Jaffrabadi.
	a. To find adulterant in the Milk (starch/ urea)
	b. Extraction of Casein from Milk and its Qualitative test.

	c. Preparation of Paneer from Milk
	d. To measure the density of Milk by Lactometry
	e. Colorimetric estimation of total fat in the Milk of different varieties by $FeCl_3$ method. (Std. graph to be provided or Concentration of Std. to be provided)
6	**Field Visit Report :** Visit to nearby Poultry farm/Goatery/Animal Husbandry farm/ Apiary/Sericulture Plant/Dairy farm/Sheep farm/ Vermiculture Unit /Fish farm/ Fish Market/ Fish Landing Center/Fish Processing Industry [Visit to minimum any one of them is compulsory as a part of study tour; either short or long to be taken as a part of the workload]

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S. Y. B. Sc. [Zoology]

Pattern for Practical Question Papers of Credit System

To be implemented from the Academic Year 2012-2013.

Skeleton for USZOP-3 [301]

Course Code USZOP-3: Animal Kingdom, Developmental Biology & Ecology

Max. Marks: - 30 **Duration: - 3 hrs**

Q.1. Major Experiment. **12**

Estimation of any **one** of - DO/ / Phosphate-Phosphorus from the given Water Sample.

OR

Estimation of Free CO_2 **and** Hardness from the given Water Sample.

OR

Estimation of Free CO_2 **and** Salinity from the given Water Sample.

Q.2. Minor Experiment. **08**

Mounting and identification of at least two foraminiferan shells from given sample of Sand.

OR

Estimation / Determination of Soil pH and Texture / Soil Texture and Soil Moisture /

Soil pH and Soil Moisture.

Q.3. Identify and describe/Sketch & label the specimens. [05 Specimens] **10**

a. Any one permanent slide or Specimen from Conjugation in Paramoecium, Binary fission in Paramecium, V. S. of Grantia and L. S. of Leucosolenia/ Polymorphism in Coelenterata or Any one Coral]
b. Observation of any one from T. S. of Liverfluke and its larvae or Heteroneries or Trochophore Larva.
c. Observation of any one larval form of Crustacea or Echinodermata.
d. Observation of any one specimen from Insect Metamorphosis or Any one Shell type in Phylum Mollusca.
e. Identification of any one from Embryology.[Type of Eggs/Blastulae/Gastrulae]

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Skeleton for USZOP-3 [302]

Course Code USZOP-3: Biochemistry, Molecular Biology and Genetics

Max. Marks: - 30 **Duration: - 3 hrs**

Q.1 Major Experiment. **12**

Prepare a Titration Curve using strong acid and base.

OR

Determination of pKa for Weak acid

OR

Selection of the Best Filter for each of the given two Coloured solutions.

Q.2 Minor Experiment **06**

Estimation of the Blood glucose level using glucometer and using glucose estimation kit [GOD/POD method]

OR

With the help of Colorimeter, determine the Concentration of the Chromophore in the sample provided. Prepare a standard graph using 5 different concentrations by dilution of standard stock.

Q.3 Two Problems based on Genetics. [One from X-linked inheritance & One from Multiple Alleles. **08**

Q.4 Temporary preparation of Any one... **04**

Barr bodies from suitable material

OR

Study of Chromosome Morphology using Onion root tip-squash preparation.

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Skeleton for USZOP-3 [303]

Course Code: USZOP- 3: Applied and Economic Zoology

Max. Marks: - 30 **Duration: - 3 hrs**

Q.1. Major Experiment. **12**

Estimation of total Protein in the given sample of Egg.

OR

Estimate total Fats/Lipids in the given sample of Egg.

Q.2. Minor Experiment. **08**

Any one Mounting of Honey bee (Mouth parts / Sting apparatus / all the three types of legs).

Q.3. Identify and describe the specimens.[05 Specimens/Permanent Slides] **10**

a. Any one Protozoan Parasite
b. Any one Specimen/Photograph of Life cycle of Honey bee or Silk worm
c. Any one harmful insect Specimen/Photograph
d. Any one Specimen/Photograph from Entomophagus or Parasitic Insect
e. Any one Specimen/Photograph from Poultry/ Goat Keeping.

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S. Y. B. Sc. [Zoology]

Pattern for Practical Question Papers of Credit System

To be implemented from the Academic Year 2012-2013.

SEMESTER IV

Skeleton for USZOP- 4 [401]

Course Code: USZOP- 4: Animal Kingdom, Cellular Organization & Ethology

Max. Marks: - 30 **Duration: - 3 hrs**

Q.1. Major Experiment. **12**

Study of Osmosis using RBCs either by Test tube method or Cavity Slide method.

Q. 2 Study of Polytene Chromosome: Temporary preparation of Salivary gland of Chironomous larva/ Drosophila/Mosquito. **08**

Q. 3 Identify and describe/Sketch & label the specimens. [05 Specimens] **10**

a. Any one specimen from Ascidian tadpole/ swim bladder in fishes/ Parental Care and Breeding
b. Any one Specimen from Adaptive radiation in reptiles/ Adaptive radiations in Mammal/ venomous snakes
c. Any one photograph/picture from ultra structure of cell organelles
d. Any one from Ethology (Instinct/Imprinting/Communication)
e. Any one from Ethology (Warning Colouration/Mimicry/ Displacement Activities)

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Skeleton for USZOP-4 [402]

Course Code USZOP-4: Biotechnology, Applied Biotechnology, Bioinformatics and Evolution.

Max. Marks: - 30 **Duration: - 3 hrs**

Q.1 **One** Problem based on any **One** of the following categories… **10**

Restriction Enzyme, Recognition sites and resultant fragments from DNA Sequences provided.

OR

Identification of genes and restriction sites on plasmid maps [pBR 322, PUC etc.]

OR

Problem based on Molecular Biology.

Q.2 Internet connectivity, Search Engines, Visits to Bioinformatics and related sites. **11**
Submission of the Project done by the student and Viva on that.

Q.3 Identify and describe (**One** example from each category) **09**

a. Types of Variations

b. Sympatric and Allopatric Speciation

c. Isolating Mechanisms

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Course Code: USZOP- 4 [403]: Applied and Economic Zoology

Max. Marks: - 30 **Duration: - 3 hrs**

Q.1. Major Experiment. **10**

Extraction of Casein from Milk and its Qualitative test.

OR

Colorimetric estimation of total fat in the Milk of different varieties by $FeCl_3$ method. (Std. graph to be provided).

Q.2. Minor Experiment. **07**

To find adulterant in the milk (Starch/ Urea)

OR

Preparation of Paneer from Milk

OR

To measure the density of Milk by Lactometry.

Q.3. Identify and describe the specimens.[04 Specimens/Permanent Slides] **08**

a. Any one Helminth Parasite/ Parasitic adaptations in helminthes.
b. Any one Specimen for Morphological Characters of a fish (Pomfret,

Shark, Sting Ray, Bombay duck and Mackerel)/Any one Identification of the specimen with reference to Fishery Biology

c. Any one Specimen/model from Crafts/Gears

d. Any one from Animal husbandry

Q.4. Field report on Visit to nearby Poultry farm/Goatry/Animal Husbandry farm/ Apiary/Sericulture Plant/Dairy farm/Sheep farm/ Vermiculture farm. **05**

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S. Y. B. Sc. [Zoology] Scheme of Examination According to Credit System to be implemented from the Academic Year 2012-2013.

A] Recommendations for the Internal Assessment for Theory	**40 marks**
a. One Periodical Test on Class Instructions	10 marks
b. Two Home Assignments	20 marks
c. Active Participation [attentiveness/ability to answer the questions]	05 marks
d. Leadership Qualities in organizing or participation in Academic or Co-curricular activities/mannerism and articulation etc.	05 marks
B] Recommendations for the Internal Assessment for Practical :	**20 marks**
a. Two best Practical Performances	10 marks
b. Journal	05 marks
c. Viva	05 marks
C] External Theory Examination:	**60 marks**

C] External Theory Examination Pattern:

a] Duration – These Examinations shall be of 2 hours duration for each Paper.

b] Theory Question Paper Pattern:-

1] There shall be four questions; each of 15 marks. On each unit, there will be one question and the fourth one will be based on the entire syllabus.

2] All questions shall be compulsory with internal choice within the questions.

[Each question will be of 20 to 23 marks with options]

3] Questions may be subdivided into sub-questions as a, b, and c and so on.

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S. Y. B. Sc. [Zoology]

Pattern for Theory Question Paper of Credit System

[Common for All Courses and Both Semesters]

To be implemented from the Academic Year 2012-2013.

Note Before: 1] All Questions will be compulsory for the candidate.

Q. 1 Based on Unit I [20-23 marks]

a] Objective type questions [a, b and c] **or** One Short answer question 03 marks

b] Short notes with options… 12 marks

a, b, c, d, e [Attempt any three]

Q. 2 Based on Unit II [20-23 marks]

a] Objective type questions [a, b and c] **or** One Short answer question 03 marks

b] Short notes with options… 12 marks

a, b, c, d, e [Attempt any three]

Q. 3 Based on Unit III [20-23 marks]

a] Objective type questions [a, b and c] **or** One Short answer question 03 marks

b] Short notes with options… 12 marks

a, b, c, d, e [Attempt any three]

Q. 4 Based on Entire Syllabus [20-23 marks]

a] Objective type questions [a, b and c] or One Short answer question 03 marks

b] Long answer Questions with options 12 marks

a, b, c [Attempt any two]

a] Based on Unit I

b] Based on Unit II

c] Based on Unit III

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