

**UNIVERSITY OF MUMBAI**  
**SOPHIA COLLEGE (AUTONOMOUS)**  
**SYLLABUS FOR F.Y. B.Sc. COURSE (ZOOLOGY)**  
**(With effect from academic year 2021-22)**

**SEMESTER I**

**Theory Course: SBSZOO101 - SYSTEMATIC CLASSIFICATION OF  
INVERTEBRATES AND ECOLOGY**

**Theory Course: SBSZOO102 - APPLIED BIOLOGY**

**Practical Course: SBSZOOP1**

**SEMESTER II**

**Theory Course: SBSZOO201 - BIODIVERSITY, EVOLUTION AND ETHOLOGY**

**Theory Course: SBSZOO202 - GENETICS AND BIOCHEMISTRY**

**Practical Course: SBSZOOP2**

## SEMESTERWISE SYLLABUS GRID FOR EACH PAPER

SEMESTER I		SEMESTER II	
<b>SBSZOO101</b>  <b>SYSTEMATIC CLASSIFICATION OF INVERTEBRATES AND ECOLOGY</b>	<b>SBSZOO102</b>  <b>APPLIED BIOLOGY</b>	<b>SBSZOO201</b>  <b>BIODIVERSITY, EVOLUTION AND ETHOLOGY</b>	<b>SBSZOO202</b>  <b>GENETICS AND BIOCHEMISTRY</b>
Unit 1 Classification of Animal Kingdom	Unit 1 Laboratory Safety and Units of Measurement	Unit 1 National Parks and Sanctuaries	Unit 1 Genetics
Unit 2 Ecosystem	Unit 2 Animal Biotechnology	Unit 2 Evolution	Unit 2 Biochemistry
Unit 3 Population Ecology	Unit 3 Instrumentation	Unit 3 Ethology	Unit 3 Nutrition and Public Health
<b>Practical SBSZOO1</b>		<b>Practical SBSZOO2</b>	

**Syllabus for F.Y.B.Sc. Course –ZOOLOGY**  
**(With effect from Academic year 2021-22)**  
**SEMESTER – I**

<b>Course Code</b>	<b>Unit</b>	<b>Title</b>	<b>Credits</b>
<b>SBSZOO101</b>		<b>SYSTEMATIC CLASSIFICATION OF INVERTEBRATES AND ECOLOGY</b>	2 Credits (45 lectures)
	1	Classification of Animal Kingdom	15 lectures
	2	Ecosystem	15 lectures
	3	Population Ecology	15 lectures
<b>SBSZOO102</b>		<b>APPLIED BIOLOGY</b>	2 Credits (45 lectures)
	1	Laboratory Safety and Units of Measurement	15 lectures
	2	Animal Biotechnology	15 lectures
	3	Instrumentation	15 lectures
		<b>PRACTICALS</b>	
<b>SBSZOO1</b>		Practicals based on both the courses	2 Credits

# FYSBC ZOOLOGY SYLLABUS - SEMESTER I

## THEORY COURSE- SBSZOO101

### SYSTEMATIC CLASSIFICATION OF INVERTEBRATES AND ECOLOGY

#### Unit 1 - Classification of Animal Kingdom

(15 Lectures)

##### **Objective:**

- *To comprehend classification of Invertebrates through the general characteristics of phyla upto class level and specific characters of the respective organisms.*

##### **Desired outcome:**

- *The learners will be familiarized with invertebrate classification and will also be able to understand the evolution of invertebrates from phylogenic aspect.*

#### **1.1 Unicellular organization:** Kingdom Protista - Phylum Protozoa

#### **1.2 Multicellular organization:**

1.2.1: Colonization level - Phylum Porifera

1.2.2: Division of labour – Phylum Cnidaria

#### **1.3 Triploblastic acoelomate and pseudoceoleomate organization**

1.3.1: Acoelomate organization – Phylum Platyhelminthes

1.3.2: Pseudocoelomate organization – Phylum Nematoda

#### **1.4 Triploblastic Coelomate organization**

1.4.1: Animals with metameric segmentation: Phylum Annelida

1.4.2: Animals with jointed appendages: Phylum Arthropoda

1.4.3: Animals with mantle: Phylum Mollusca

1.4.4: Animals with enterocoel: Phylum Echinodermata

#### Unit 2- Ecosystem

(15 Lectures)

##### **Objective:**

- *To impart knowledge of different components of ecosystem and educate about essentials of coexistence of human beings with all other living organisms.*

##### **Desired Outcome:**

- *Learners will grasp the concept of interdependence and interaction of physical, chemical and biological factors in the environment.*
- *It would lead to better understanding about implications of loss of fauna specifically on human beings, erupting a spur of desire for conservation of all flora and fauna.*

## **2.1: Concept of ecosystems**

2.1.1: Definition and components

## **2.2 Biogeochemical cycles**

2.2.1: Water, Oxygen, Nitrogen, Sulphur

## **2.3 Freshwater ecosystem**

2.3.1: Lentic

2.3.2: Lotic

## **2.4 Food chains and food webs in ecosystems**

2.4.1: Freshwater

2.4.2: Grassland

## **2.5 Ecological pyramids of energy, biomass and number**

## **2.6 Animal interactions:**

2.6.1: Commensalism

2.6.2: Mutualism

2.6.3: Predation

2.6.4: Parasitism

2.6.5: Antibiosis

## **Unit 3 - Population Ecology**

**(15 Lectures)**

### **Objective:**

- *To facilitate the learning of population ecology, its dynamics and regulatory factors important for its sustenance.*

### **Desired Outcome:**

- *This unit would allow learners to study about nature of animal population, specific factors affecting its growth and its impact on the population of other life forms.*

## **3.1 Population Dynamics**

3.1.1: Population density, Natality, Mortality

3.1.2: Fecundity, Age structure, Sex ratio

3.1.3: Survivorship curves

3.1.4: Population dispersal and distribution patterns

3.1.5: Niche concept

### **3.2 Population growth regulation**

- 3.2.1: Intrinsic mechanism – Density dependent fluctuations and oscillations
- 3.2.2: Extrinsic mechanisms – Density dependent, environmental and climatic factors
- 3.2.3: Population interaction

### **3.3 Population growth pattern**

- 3.3.1: Sigmoid
- 3.3.2: 'J' shaped

## **THEORY COURSE SBSZOO102**

### **APPLIED BIOLOGY**

#### **Unit 1- Laboratory Safety and Units of Measurement**

**(15 Lectures)**

##### **Objective:**

- *To make learners aware of risks involved in handling of different hazardous chemicals, sensitive (electrical/electronic) instruments and infectious biological specimens, especially during practical sessions in the laboratory and to train them to avoid mishap.*
- *To understand the concepts of measurements.*
- *To understand parameters used in biostatistics.*

##### **Desired Outcome:**

- *Learners would work safely in the laboratory thus enhancing their scholastic performance and economy in use of materials/chemicals during practical sessions.*
- *Learners would be able to realize the micro and macro quantities of the matter and chemical concentrations.*
- *Learners would be able to appreciate the importance of biostatistics tools of data analysis.*

#### **1.1: Introduction to good laboratory practices**

#### **1.2: Use of safety symbols: meaning, types of hazards and precautions**

#### **1.3: Units of measurement:**

- 1.3.1: Calculations and related conversions of each: Metric system- length (meter to micrometer), weight (gram to microgram), Volumetric (Cubic measures)
- 1.3.2: Temperature: Celsius, Fahrenheit, Kelvin
- 1.3.3: Biostatistics: Introduction and scope, Sampling and its types, Central tendencies (mean, median, mode), Tabulation, Graphical representations (Histograms, bar diagrams, pie diagrams).

## Unit 2- Animal Biotechnology

(15 Lectures)

### **Objective:**

- *To acquaint learners to the modern developments and concepts of Zoology highlighting the biotechnological applications in various fields.*

### **Desired Outcome:**

- *Learners would understand recent advances in the subject and their applications for the betterment of mankind.*
- *Learners may get enthused to take up research as their future academic endeavour.*

**2.1: Biotechnology:** Scope and achievements of Biotechnology (Fishery, Animal Husbandry, Medical, Industrial)

**2.2: Transgenesis:** Retroviral vector method, Nuclear transplantation method, DNA microinjection method and Embryonic stem cell method

**2.3: Cloning :** Dolly as the first cloned animal

**2.4: Ethical issues of transgenic and cloned animals**

**2.5: Applications of Biotechnology:**

2.5.1: DNA fingerprinting: Technique in brief and its application in forensic science (Crime Investigation & wild life conservation)

2.5.2: Recombinant DNA in medicines (recombinant insulin)

2.5.3: Gene therapy: Ex-vivo and *In vivo*, Severe Combined Immunodeficiency (SCID), Cystic Fibrosis

2.5.4: Green genes: Green Fluorescent Protein (GFP) from Jelly fish-valuable as reporter genes used to detect food poisoning.

## Unit 3- Instrumentation

(15 Lectures)

### **Objective:**

- *To provide all learners a complete insight about the structure and working of different instruments used in Zoology.*
- *To impart hands on operational skills.*

### **Desired Outcome:**

- *Learners will appreciate the use of techniques and the application of the instruments used in the laboratory.*
- *Learners will be skilled to select and operate suitable instruments for this course and also for higher classes including research.*

**3.1: Microscopy** - Construction, principle and applications of dissecting and

compound microscope

- 3.2: Colorimetry and Spectroscopy** - Principle and applications
- 3.3: pH** – Buffer systems, Sorenson’s pH scale, pH meter - principle and applications
- 3.3: Centrifugation** - Principle and applications (clinical and ultra centrifuges)
- 3.4: Chromatography** - Principle and applications (Partition and Adsorption), Basic principle and applications of column chromatography, affinity chromatography and HPTLC
- 3.5: Electrophoresis** - Principle and applications (AGE and PAGE)

## **PRACTICAL COURSE SBSZOOPI**

### **PRACTICAL I**

#### 1. Classification of Animal Kingdom

1.1: Protozoa : *Amoeba*, *Paramecium*, *Euglena*, *Plasmodium*

1.2: Porifera: *Leucosolenia*, *Euplectella*, Bath sponge

1.3: Cnidaria: *Hydra*, *Obelia* colony, *Aurelia*, Sea anemone

1.4: Platyhelminthes: *Planaria*, Liverfluke, Tapeworm

1.5: Nematelminthes: *Ascaris* – male and female

1.6: Annelida: *Nereis*, Earthworm, Leech

1.7: Arthropoda: Crab, lobster, dragonfly, butterfly, spider, scorpion, centipede, millipede

1.8 : Mollusca : *Chiton*, *Dentalium*, *Pila*, *Unio*, *Sepia*, *Nautilus*

1.9 Echinodermata: Starfish, brittlestar, featherstar, sea urchin, sea cucumber

2. Study of *Paramecium* culture to observe food vacuole, contractile vacuole and ciliary movement

3. Determination of population density (*Daphnia* or any other suitable organism) by sub-sampling method

4. Mounting of foraminiferan shells from sand

5. Study of parapodium of *Nereis*



6. Study of mouthparts of insects – Biting and chewing, piercing and sucking, siphoning, sponging
7. Study of food webs and food chains in an ecosystem - Students to present their study through PPT / Chart presentations.
8. Report on study trip to Nature Park / Zoological garden.

### **PRACTICAL II**

1. Study of instruments used in the lab – Principle and working
  - a) Compound microscope
  - b) Dissecting microscope
  - c) Colorimeter
  - d) Centrifuge
  - e) Spectrophotometer
  - f) pH meter
2. Interpretation of safety symbols (toxic, corrosive, explosive, flammable, skin irritant, oxidizing, compressed gases, aspiration hazards and Biohazardous infectious material).
3. Study of aseptic techniques to aseptically transfer culture media between the burners and also using Laminar flow.
4. Separation of pigments by adsorption chromatography using chalk.
5. Separation of amino acids using Paper Chromatography.
6. Separation of lipids by Thin Layer Chromatography (TLC).
7. Study of Beer- Lambert Law using different concentrations of a coloured solution.
8. Estimation of pH of different solutions using BDH indicator, red cabbage and pH paper.
9. Identification of transgenic fish (Trout and Salmon) / cloned animals (Dolly sheep, CC cat, Snuppy dog, cloned animals from India ) from photograph.
10. Application of DNA Fingerprinting in criminology and wild life conservation (photograph of electrophoretic pattern to be given for interpretation by the students.
11. Study of central tendencies and plotting of bar diagram, histogram and pie diagram.

**N.B.** The practicals could be conducted by using specimens authorized by the wildlife and such other regulating authorities. However, adhering to the directions as given in the UGC Circular F14-4/2006 (CPP-II), the practicals will be taught by using photographs/audio-visual aids/simulations / models, etc. as recommended by the UGC and as envisaged in the regulations of the relevant monitoring bodies.

## **MODIFIED SCHEME OF EXAMINATION**

**Due to the current COVID Pandemic situation, examinations to be held through online mode (subject to the notification from the Govt. of Maharashtra and University of Mumbai from time to time)**

**Maximum Marks allotted for each theory course per semester: 100 marks**

**This will have two components as follows:**

- (a) Internal assessment of total of Fifty (50) marks per course per semester
- (b) External assessment out of Fifty (50) marks per course per semester shall be conducted as semester end theory examination

**Maximum Marks allotted for the entire practical course per semester: 100 marks which will be distributed into the following two examination sessions and conducted as per the given question paper pattern:**

- (a) Practical I examination of fifty (50) marks shall be conducted at the end of every semester.
- (b) Practical II examination of fifty (50) marks shall be conducted at the end of every semester.

### **PAPER PATTERN OF PRACTICAL EXAMINATION**

#### **SBSZOOP1**

#### **PRACTICAL I EXAMINATION**

**Duration : 2 hrs30 min**

**Marks: 50**

Q. 1. Prepare the temporary mounting of foraminiferan shells and identify minimum three types. (09 Marks)

**OR**

Q.1. Prepare the temporary mounting of parapodium of *Nereis*. (09 Marks)

Q.2. Determine of population density of the given organism by sub-sampling method (06 Marks)

**OR**

Q.2. Demonstrate the observations of food vacuole, contractile vacuole and ciliary movement of *Paramecium* from the given culture. (06 Marks)

Q.3. Identification based on animal classification and mouthparts of insects. (A-E) (15 Marks)

Q.4. Presentation based on study of food web and food chains in an ecosystem (05 marks)

Q.5. Report on study trip and Viva voce based on it (10 Marks)

Q.6. Certified journal (05 Marks)

## PRACTICAL II EXAMINATION

**Duration: 2 hrs30 min**

**Marks: 50**

Q.1. Estimate concentration of the given unknown solution using colorimeter from the standard as well as calculations (15 marks)

**OR**

Q.1. Determine pH of the given samples with the help of the given indicators and pH meter and comment on their chemical nature (15 marks)

**OR**

Q. 2. Perform experiment for separation of pigments by adsorption chromatography (10Marks)

**OR**

Q.2. Perform experiment for separation of mixture of amino acids by paper chromatography (10Marks)

**OR**

Q.2. Perform Thin Layer Chromatography (TLC) for separation of lipids (10Marks)

Q. 3. Prepare a frequency distribution table / Plot histogram / Pie diagram / Bar diagram from the given data (5 marks)

**OR**

Q.3. Demonstrate aseptic technique to transfer culture media/ solution from flask to test tube with the help of a pipette (5 Marks)

Q. 4. Identification (A-E) (10 Marks)  
(Safety Symbols (two), lab instruments, transgenic/cloned animals, DNA fingerprinting)

Q.5. Certified journal & Viva voce based on practicals (10 Marks)

## Syllabus for F.Y.B.Sc. Course –ZOOLOGY

(With effect from Academic year 2021-22)

### SEMESTER – II

Course Code	Unit	Title	Credits
<b>SBSZOO201</b>		<b>BIODIVERSITY, EVOLUTION AND ETHOLOGY</b>	2 Credits (45 lectures)
	1	National Parks and Sanctuaries	15 lectures
	2	Evolution	15 lectures
	3	Ethology	15 lectures
<b>SBSZOO202</b>		<b>GENETICS AND BIOCHEMISTRY</b>	2 Credits (45 lectures)
	1	Unit 1- Genetics	15 lectures
	2	Unit 2 – Biochemistry	15 lectures
	3	Unit 3- Nutrition and Public Health	15 lectures
		<b>PRACTICALS</b>	
<b>SBSZOO2</b>		Practicals based on both the courses	2 Credits

## THEORY COURSE SBSZOO201

### BIODIVERSITY, EVOLUTION AND ETHOLOGY

#### Unit 1- National Parks and Sanctuaries

(15 Lectures)

##### **Objective:**

- *To enlighten learners about the current status of wild life conservation in India in the light of guidelines from different relevant governing agencies vis-à-vis with adversity of poaching and biopiracy.*

##### **Desired Outcome:**

- *Learners would be inspired to choose career options in the field of wild life conservation, research, photography and ecotourism*

**1.1 Concept of endangered and critically endangered** species using examples of Indian Wildlife with respect to National Parks and Wildlife Sanctuaries of India with reference to CITES, Red data book

- 1.1.1: Sanjay Gandhi National Park
- 1.1.2: Tadoba Tiger Reserve
- 1.1.3: Corbett National Park
- 1.1.4: Kaziranga National Park
- 1.1.5: Gir National Park
- 1.1.6: Silent Valley
- 1.1.7: Pirontan Island Marine Park
- 1.1.8: Ghana National Park
- 1.1.9: Bandipur Sanctuary

**1.2 Management strategies** with special reference to Tiger and Rhinoceros in India

- 2.2.1: Project Tiger
- 2.2.2: Project Rhinoceros

**1.3 Ecotourism**

**1.4 Biopiracy**

#### Unit 2 – Evolution

(15 Lectures)

##### **Objective:**

- *To enlighten learners about how life started on earth and then evolved into the myriad species seen today.*

##### **Desired Outcome:**

- *The learners will gain the insight into process of evolution through various theories and evidences*

**2.1 Introduction:** Origin of Universe, Chemical evolution - Miller-Urey experiment, Haldane and Oparin theory

**2.2: Origin of life, Origin of eukaryotic cell**

**2.3: Geological Time Scale**

**2.4: Evidences in favour of organic evolution:** Geographical distribution, Paleontology Anatomy, Embryology, Physiology and Genetics.

**2.5: Theories of organic evolution**

2.5.1: Theory of Lamarck

2.5.2: Theory of Darwin and Neo Darwinism

2.5.3: Mutation Theory

2.5.4: Modern Synthetic Theory

2.5.5: Weismann's Germplasm Theory

2.5.6: Neutral Theory of Molecular Evolution

### **Unit 3– Ethology**

**(15 Lectures)**

#### **Objective:**

- To acquaint the learners about the aspects of animal behaviour.
- To make the concepts of animal learning understandable considering various aspects.

#### **Desired outcome:**

- Learners will be able to understand the characteristics of animal behaviour.
- Learners will be able to appreciate the animal learning and its different aspects.
- Learners may be enthused to take up field studies to observe such behaviours and learning mechanisms of animals in their natural habitat.

#### **3.1: Development of behaviour:**

3.1.1: Ontogeny of behavior

3.1.2: Environmental influence on behaviour

3.1.3: Sensitive periods during development

3.1.4: Juvenile behavior

3.1.5: Innate behavior

#### **3.2 Animal Learning:**

3.2.1: Conditioning and learning

3.2.2: Classical Conditioning, acquisition, extinction

3.2.3: Habituation and generalization

3.2.3: Instrumental learning,

3.2.4: Reinforcement, Operant behavior

### **3.3: Biological aspects of learning**

### **3.4: Constraints of learning:**

- 3.4.1: Learning to avoid enemies, mimicry
- 3.4.2: Learning to avoid sickness
- 3.4.3: Stimulus relevance

### **3.5: Cognitive aspects of learning:**

- 3.5.1: Hidden Nature of conditioning
- 3.5.2: Nature of cognitive process
- 3.5.3: Insight learning
- 3.5.4: Associative learning and representation

## **THEORY COURSE SBSZOO202**

### **GENETICS AND BIOCHEMISTRY**

#### **Unit 1- Genetics**

**(15 Lectures)**

#### **Objective:**

- *To introduce the learner to the basic terms and concepts of genetics.*
- *To study Mendelian and other types of inheritance.*
- *To understand application of genetic studies.*

#### **Desired outcome:**

- *Learners will understand and apply the principles of inheritance for various case studies.*
- *Learners would be able to realize the importance of genetic studies.*

#### **1.1: Introduction to genetics:**

- 1.1.1: Definition, scope and importance of genetics
- 1.1.2: Classical and Modern concept of Gene
- 1.1.3: Explanation of terms: Allele, wild type and mutant alleles, locus, dominant and recessive traits, genotype and phenotype, homozygous and heterozygous

#### **1.2: Mendelian Inheritance:**

- 1.2.1: Monohybrid and Dihybrid cross
- 1.2.2: Test cross and Back cross
- 1.2.3: Exceptions to Mendelian inheritance: Incomplete dominance, Co-dominance, Lethal alleles, Epistasis and its types

**1.3: Pedigree analysis:** Autosomal dominant and recessive, sex-linked dominant and recessive traits.

**1.4: Genetic Counselling:** Risk of recurrence of hereditary diseases, screening for genetic disorders, causes and significance of genetic counseling.

**1.5: Cytoplasmic Inheritance:** Kappa particles in *Paramecium*, Sigma factor in *Drosophila*, Shell coiling in Gastropoda.

## **Unit 2 – Biochemistry**

**(15 Lectures)**

### **Objective:**

- *To give learners insights about the structure and function of the biomolecules.*

### **Desired outcome:**

- *Learner will be well versed with the foundations of biochemistry.*
- *Learners will realize the biological role and clinical significance of the biomolecules.*

**2.1: Biomolecules:** Concept of Micromolecules and Macromolecules and their significance

### **2.2: Carbohydrates**

- 2.2.1: Definition Classification, Properties and Isomerism, Glycosidic bond
- 2.2.2: Structure of Monosaccharides- Glucose, Galactose and Fructose
- 2.2.3: Disaccharides –Maltose, Lactose and Sucrose
- 2.2.4: Polysaccharides - Cellulose, Starch, Glycogen and Chitin
- 2.2.5: Biological role and their Clinical significance

### **2.3: Amino Acids and Proteins**

- 2.3.1: Basic structure of amino acid, Classification of amino acids, Essential and Non-essential amino acids
- 2.3.2: Peptide bond
- 2.3.2: Protein conformation: Primary, Secondary, Tertiary, and Quaternary
- 2.3.4: Biological role of proteins and their Clinical significance

### **2.4: Lipids**

- 2.4.1: Definition, Saturated and Unsaturated fatty acids, Essential fatty acids
- 2.4.2: Ester linkage and Classification of lipids with examples,
- 2.4.3: Structure of Triacylglycerides, Phospholipids (Lecithin and Cephalin) and Cholesterol
- 2.4.4: Biological role and their Clinical significance

## **Unit 3- Nutrition and Public Health**

**(15 Lectures)**

### **Objective:**

- *To make learners understand the importance of balanced diet and essential nutrients of food at different stages of life.*

### **Desired Outcome:**

- *Awareness about healthy dietary habits and importance of a healthy life style would be created among the learners.*



➤ *Learners will also appreciate various health initiatives taken at national level.*

**3.1: Concept of balanced diet**, dietary recommendation to a normal adult, infant, pregnant women and aged, importance of fibres in food.

**3.2: Concept of Health:**

3.2.1: Definition of health, need for health education and health goals

3.2.2: Physical, Psychological and Social health issues

3.2.3: WHO and its programmes – Polio, Small pox, Malaria and Leprosy

**3.3: Malnutrition disorders and their status in India** – Anaemia, Rickets, Marasmus, Goitre, Kwashiokar

**3.4: Obesity, BMI calculation and its significance**

**3.5: Stress related disorders:** Hypertension, Anxiety, Insomnia, Migraine, Depression, Psoriasis (cause, symptoms, precaution and remedy).

## **PRACTICAL COURSE SBSZOOP2**

### **PRACTICAL I**

1. Study of national parks, sanctuaries and bio reserves in India with respect to its brand fauna as listed in theory.
2. Study of endangered / critically endangered species in India as per IUCN Red List
3. Project submission on any of the conservation efforts carried out by the Indian Government (Eg. Project Tiger, Project Rhinoceros etc). Students will present a PPT presentation on the chosen topic).
4. Study of identification of homologous and analogous organs as evidences of evolution.
5. Study of Ecotourism with the help of case studies:
  - a. Garhwal region
  - b. Konkan region
6. Study of ethology:
  - a. Classical conditioning
  - b. Juvenile behavior in animals

- c. Innate behavior
  - d. Instrumental learning
  - e. Learning to avoid enemies, mimicry
  - f. Learning to avoid sickness (antenna cleaning behavior of cockroach)
  - g. Insight learning
7. Study of biodiversity hotspots in India (Western Ghats and Indo- Burma).
8. Identification and study of fossils:
- a. Arthropods: Trilobite
  - b. Mollusca: Ammonite
  - c. Aves: Archaeopteryx
  - d. Living Fossils – Limulus, Coelocanth
9. Report based on study trip.

## **PRACTICAL II**

1. Qualitative tests for carbohydrates (Molisch's test, Benedict's test, Barfoed's test, Anthrone test).
2. Qualitative tests for protein (Ninhydrin test, Biuret test, Xanthoproteic test, Bradford's test, Folin-Lowry test).
3. Qualitative test for lipids (Solubility test, Sudan III test).
4. Study of rancidity of lipid by titrimetric method.
5. PPT presentations by students on clinical disorders due to carbohydrates, proteins and lipids imbalance. (Photograph to be provided / significance to given and disorder to be identified).
  - a. Hyperglycemia , Hypoglycemia and Diabetes
  - b. Kwashiorkar, Marasmus
  - c. Obesity, Atherosclerosis
  - d. Thalessemia, Anaemia
  - e. Goitre, Rickets
6. Problems in genetics based on monohybrid and dihybrid ratios.

7. Problems based on analysis of pedigree charts - Autosomal dominant and recessive, sex-linked dominant and recessive traits.

8. BMI analysis – Measurement of height and weight (50 readings) and calculation of BMI and report submission based on analysis of the result obtained.

**N.B.** The practicals could be conducted by using specimens authorized by the wildlife and such other regulating authorities. However, adhering to the directions as given in the UGC Circular F14-4/2006 (CPP-II), the practicals will be taught by using photographs/audio-visual aids/simulations / models, etc. as recommended by the UGC and as envisaged in the regulations of the relevant monitoring bodies.

### **MODIFIED SCHEME OF EXAMINATION**

**Due to the current COVID Pandemic situation, examinations to be held through online mode (subject to the notification from the Govt. of Maharashtra and University of Mumbai from time to time)**

**Maximum Marks allotted for each theory course per semester: 100 marks  
This will have two components as follows:**

- (c) Internal assessment of total of Fifty (50) marks per course per semester
- (d) External assessment out of Fifty (50) marks per course per semester shall be conducted as semester end theory examination

**Maximum Marks allotted for the entire practical course per semester: 100 marks which will be distributed into the following two examination sessions and conducted as per the given question paper pattern:**

- (c) Practical I examination of fifty (50) marks shall be conducted at the end of every semester.
- (d) Practical II examination of fifty (50) marks shall be conducted at the end of every semester.

**PAPER PATTERN OF PRACTICAL EXAMINATION**  
**SBSZOOP2**  
**PRACTICAL I EXAMINATION**

**Duration : 2 hrs30 min**

**Marks: 50**

Q.1. Identify brand animals (Min. 4) and place them in their respective National parks/ Sanctuaries on the given map quoting reasons for their decline. (10 Marks)

**OR**

Mark National parks and Sanctuaries on the map of India and mention the name of their brand animals stating reason for their decline. (Min. 4) (10 Marks)

Q.2. Project report conservation efforts of wildlife conservation by the Indian government and viva based on it. (10 marks)

Q.3. Identification based on ethology, eco tourism, biodiversity hotspots, evidences of evolution, fossils. (A-E) (10 marks)

Q.4. Field report & Viva voce based on it (10 marks)

Q.5. Viva voce based on practicals (5 marks)

Q.6. Journal (5 marks)

**PRACTICAL II EXAMINATION**

**Time: 2 hrs30 min**

**Marks: 50**

Q.1. Perform the qualitative tests for carbohydrates. (15 marks)

**OR**

Q.1 Estimate the rancidity of given lipid sample by titrimetric method. (15 marks)

**OR**

Q.1. Perform the qualitative tests for protein and lipids. (15 marks)

Q.2. Solve the given genetics problems (5 marks)

Q.3. Analyze the given pedigree chart / construct the pedigree chart based on the information. (5 marks)

Q.4. Submission of report on survey of BMI and viva on it (5 marks)

Q.5. PPT presentation on Clinical disorders (5marks)

Q.6. Viva voce based presentations of clinical disorders (5 marks)

Q.6. Journal (5 marks)