

## Revised Syllabus For 2020-21 session

### Biology

#### Ist year Science(Theory)

Unit I : Diversity in living world

Unit II: Structural organization in animals and plants

Unit III: Cell structure and function

Unit IV: Plant physiology

Unit V: Human physiology

### Biology

#### 2nd year Science(Theory)

Unit I: Reproduction

Unit II: Genetics and Evolution

Unit III: Biology and Human Welfare

Unit IV: Biotechnology and its applications

Unit V: Ecology and Environment

#### Ist year Science(Theory)

##### Theory

(The no on the right is periods required excluding the deleted portion)

#### I. Diversity in Living World (Periods 10)

a. What is living?, Biodiversity; Need for classification; Three domains of life; Concept of species and taxonomical hierarchy; Binomial nomenclature; (02)

b. Five Kingdom classification; Salient features and classification of Monera, Protista and Fungi into major groups; Lichens; Viruses and Viroids.

c. Salient features and classification of plants into major groups- Algae, Bryophytes, Pteridophytes, Gymnosperms (three to five salient and distinguishing features and at least two examples of each category); d.

Salient features and classification of animals- non-chordates up to phyla level and chordates up to classes level (three to five salient features and at least two examples). (04)

#### II. Structural Organization in Animals and Plants (Periods 12)

a. Deleted

#### III. Cell Structure and Function

a. Cell theory and cell as the basic unit of life; Structure of prokaryotic and eukaryotic cell; Plant cell and animal cell; Cell envelope, cell membrane, cell wall; Cell organelles structure and function; Endomembrance system- endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, microbodies; Cytoskeleton, cilia, flagella, centrioles (ultra structure and function); nucleus' nuclear membrane, chromatin, nucleolus.

b. Chemical constituents of living cells: Biomolecules- structure and function of proteins, carbohydrates, lipid, nucleic acids; Enzymes-types, properties, enzyme action. Cell division: Cell cycle, mitosis, meiosis and their significance.

#### IV. Plant Physiology (Period 16)

a. Deleted

b. Deleted

##### c. Photosynthesis in Higher Plants (This part is added)

Photosynthesis as a means of autotrophic nutrition; site of photosynthesis, pigments involved in photosynthesis (elementary idea); photochemical and biosynthetic phases of photosynthesis; cyclic and non-cyclic photophosphorylation; chemiosmotic hypothesis; photorespiration; C<sub>3</sub> and C<sub>4</sub> pathways; factors affecting photosynthesis.

d: **Respiration:** Exchange of gases; Cellular respiration- glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); Energy relation - Number of ATP molecules generated; Amphibolic pathways; Respiratory quotient.

e. **Plant growth and Development:** Growth regulators-auxin, gibberellin, cytokinin, ethylene, Absciscic acid (ABA);

#### V. Human Physiology (Periods 30)

a. Deleted

b. **Breathing and Respiration:** Respiratory organs in animals (tracheal, bronchial, cutaneous, pulmonary); Respiratory system in humans; Mechanism of respiration (breathing) and its regulation in humans- Exchange of gases, transport of gases, Respiratory volumes; Disorders related to respiration- Asthma, Emphysema, Occupational respiratory disorders. (04)

c. **Body fluids Circulation:** Composition of blood, blood groups, coagulation of blood; Composition of lymph and its function; Human circulatory system- Structure and working of human heart, blood vessels; Cardiac cycle, cardiac output, ECG; Double circulation; Regulation of cardiac activity. Disorders of circulatory system- Hypertension, Coronary artery disease, Angina pectoris, Heart failure. (05)

d. **Excretory products and their elimination:** Modes of excretion- Ammonotelism, ureotelism, uricotelism; Human excretory system- structure and function; Mechanism of Urine formation. Osmoregulation: Regulation of kidney function- Renin-angiotensin, Atrial Natriuretic Factor, ADH and Diabetes insipidus; Role of other organs in excretion; Disorders- Uraemia, Renal failure, Renal calculi, Nephritis; Dialysis and artificial kidney. (05)

e. Deleted

f. **Neural control and Coordination:** Neuron and nerves; Nervous system in humans central nervous system (brain, spinal cord), peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse; (04)

g. **Chemical coordination and Regulation:** Endocrine glands and hormones; Human endocrine system- Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Mechanism of hormone action (Elementary Idea); Role of hormones as messengers and regulator, Hypo- and hyperactivity and related disorders (Common disorders e.g. Dwarfism, acromegaly, cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease). (04)

(NB: Ib, c; IIa; III and IV units are to be taught by Botany Faculty. Ia, d; IIb; V units are to be taught by Zoology Faculty.)

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## **Biology** **2nd Year Science** **Theory**

### **I. Reproduction**

a.

**Sexual reproduction in flowering plants:** Flower structure; Development of male and female gametophytes; Pollination-types, agencies and examples; Outbreeding devices; Pollen-Pistil interaction; Double fertilization; Post fertilization events Development of endosperm and embryo, Development of seed and formation of fruit; Special modes apomixis, parthenocarpy, polyembryony; Significance of seed and fruit formation.

b. **Human Reproduction:** Male and female reproductive systems; Microscopic anatomy of testis and ovary; Gametogenesis- spermatogenesis & oogenesis; Menstrual cycle; Fertilisation, embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elementary idea). (10)

**Reproductive health:** Need for reproductive health and prevention of sexually transmitted diseases (STD); Birth control- Need and Methods, Contraception and Medical Termination of Pregnancy (MTP); Amniocentesis; Infertility and assisted reproductive technologies -IVF, ZIFT, GIFT (Elementary idea for general awareness). (08)

## II. Genetics and Evolution (Periods 20)

a. **Heredity and Variation:** Mendelian Inheritance; Deviations from Mendelism-Incompleteness, Co-dominance, Multiple alleles and Inheritance of blood groups, Pleiotropy; Elementary idea of polygenic inheritance; Chromosome theory of inheritance; Chromosomes and genes; Linkage and crossing over.

b. **Sex determination**- In humans, birds, honey bee; **Sex linked inheritance**- Haemophilia, Colour blindness; Mendelian disorders in humans- Thalassaemia; Chromosomal disorders in humans- Down's syndrome, Turner's and Klinefelter's syndromes. (04)

c. **Molecular Basis of Inheritance:** Search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; Transcription, Genetic code, Translation; Gene expression and regulation- Lac Operon; Genome and human genome project; DNA fingerprinting.

d. Deleted

## III. Biology and Human Welfare (Periods 08)

a. **health and Disease:** Pathogens; parasites causing human diseases (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology- vaccines; Cancer, HIV and AIDS; Adolescence, drug and alcohol abuse. (04)

b. **Improvement in food production:**

i), Biofortification;

ii)

c. **Microbes in human welfare:** In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.

## IV. Biotechnology and its Applications (Periods 08)

a. **Principles and process of Biotechnology:** Genetic engineering (Recombinant DNA technology). (04)

b. **Application of Biotechnology in health and agriculture:** Human insulin and vaccine production, gene therapy; Genetically modified organisms- Bt crops; Transgenic Animals; Biosafety issues- Biopiracy and patents. (04)

## V. Ecology and environment (Periods 12)

a. **Organisms and environment:** Habitat and niche; Population and ecological adaptations; population interactions- mutualism, competition, predation, parasitism; Population attributes- growth, birth rate and death rate, age distribution.

b. Deleted

c. **Biodiversity and its conservation:** Concept of Biodiversity; Patterns of Biodiversity; Importance of Biodiversity; Loss of Biodiversity,

conservation; Hotspots, endangered organisms, extinction, Red Data Book: Biosphere reserves, National parks and Sanctuaries.

**Environmental issues: Deleted**

(NB: Ia, II a, c; III b (i), c and v units are to be taught by Botany Faculty. I b; II b; III a, b(ii); IV units are to be taught by Zoology Faculty.)

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**QUESTION PATTERN AND DISTRIBUTION OF MARKS**

**BIOLOGY - II Theory**

+ 2 Second Year Science

**Section A - Botany**

**Time : 1.5 hours Full Marks : 35**

**Group A: (Objective Type- Compulsory)**

Q1.- Multiple choice/ one word answer : 1 mark each x 5 = 5 marks

Q2.- Correct the sentences/ Fill up the blanks : 1 marks each x 5 = 5 marks

**Group B: (Short Answer Type)**

Q3.- Answer within three sentences : 2.5 marks each x 3 = 7.5 marks

Q4.- Difference between (3 important differences)

(1 bit to be answered out of 3 bits) : 3.5 marks = 3.5 marks

**Group C: (Long Answer Type)**

Answer two questions out of four : 7 marks x 2 = 14 marks

**Section B - Zoology**

**Time : 1.5 hours Full Marks : 35**

**Group A: (Objective Type- Compulsory)**

Q1.- Multiple choice/ one word answer : 1 mark each x 5 = 5 marks

Q2.- Correct the sentences/ Fill up the blanks : 1 marks each x 5 = 5 marks

**Group B: (Short Answer Type)**

Q3.- Answer within three sentences : 2.5 marks each x 3 = 7.5 marks

(3 bits to be answered out of 6 bits)

Q4.- Difference between (3 important differences)

(1 bit to be answered out of 3 bits) : 3.5 marks = 3.5 marks

**Group C: (Long Answer Type)**

Answer two questions out of four : 7 marks x 2 = 14 marks

N.B: Long answer type questions are to be set only from the portions understand in the syllabus.

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**BIOLOGY - II (Botany) Practical**

+2 Second Year Science

**Detailed Syllabus**

**Major Experiment:**

1. Study of the effect of temperature and chemicals (ethanol, acetone, formaldehyde) on **leaching** of pigments in beet root.

2.

3. Study of transpiration by Ganong's or Farmer's potometer.
4. Study of relation between transpiration and absorption by T/A apparatus.
5. Effect of different wave length of light on photosynthesis by Wilmott's bubbler.

6.

7.

8. Collect and study soil from at least two different sites and study them for texture, moisture content, pH and water holding capacity of soil. Correlate with the kinds of plants found in them.

9.

10.

11. Study of plant population density by quadrat method.
12. Study of plant population frequency by quadrat method.

#### **Minor Experiments:**

13. Study of pollen germination on a slide.
14. Study of distribution of stomata on upper and lower surface of a dicot and a monocot leaf.
15. Study of osmosis by potato osmometer.

16

17. Study of plasmolysis.

#### **Spotting:**

18. Conditions necessary for seed germination.

19.

20. Phototropism/
21. Morphological adaptation of hydrophyte and Xerophyte.

### **QUESTION PATTERN AND DISTRIBUTION OF MARKS**

#### **BIOLOGY - II (Botany) Practical**

#### **+ 2 Second Year Science**

1. Major experiment (One) : 7 marks

2

2. Spotting (Two) : 3 marks

#### **3. Viva voce: 3 marks (Recommended by Syllabus committee)**

4. Record : 2 marks

Total : 15 Marks

#### **Instruction:**

5. All the above experiments should be conducted by individual student.
6. Questions for major and minor experiments are to be set by drawing lots.
7. For each major and minor experiments, candidates have to write the requirements as per their questions which may be verified and signed by the external examiner only.

8. One observation for major experiment may be verified and signed by the external examiner only.

## **Section B - Zoology (Theory) First year**

**Time : 1.5 hours Full Marks : 35**

### **Group A: (Objective Type - compulsory)**

Q1.- Multiple choice/ one word answer : 1 mark each x 5 = 5 marks

Q2.- Correct the sentences/ Fill up the blanks : 1 marks each x 5 = 5 marks **Group B: (Short Answer Type)**

Q3.- Answer within three sentences : 2.5 marks each x 3 = 7.5 marks (3 bits to be answered out of 6 bits)

Q4.- Differentiate between (3 important differences) (1 bit to be answered out of 3 bits) : 3.5 marks = 3.5 marks

### **Group C: (Long Answer Type)**

Answer two questions out of four : 7 marks each x 2 = 14 marks N.B: Long answer type questions are to be set only from the portions underlined in the syllabus.

### **BIOLOGY - I (Zoology) Practical +2 First year Science Detailed Syllabus**

#### **A. EXPERIMENTS/ OBSERVATIONS:**

1. To test the presence of carbohydrate, protein and fat in suitable animal materials (qualitative only).

#### **B. SPOTTINGS/ IDENTIFICATION:**

a. Study of specimens and identification with reasons- Amoeba, Hydra, Sycon, Liver fluke, Earthworm, Leech, Cockroach, Prawn, Snail and Starfish.

b. Study of squamous epithelium, muscle fibres and mammalian blood film; (temporary/ permanent slides).

c. Study and comment on the morphological adaptations of two animals (Tree frog, Bat) found in terrestrial conditions and two animals (Flying fish,) found in aquatic conditions.

Book Recommended : Bureau's Higher Secondary (+2) Zoology, Practical, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

### **QUESTION PATTERN AND DISTRIBUTION OF MARKS**

BIOLOGY - I (Zoology) Practical +2 First year Science (For College Level Exam) Time : 2 hours Full marks : 15

1. Experiment (One experiment to be set from A) : 07 marks

Theory and Procedure - 03 marks Experiment,

Observation and Results - 04 marks

2. Spotting (2 spots to be set from B) - 1.5 marks x 2 : 03 marks (one from bit a, one from bit b or c)

3. Viva voce : 03

4. Practical Record : 02 marks

**QUESTION PATTERN AND DISTRIBUTION OF MARKS**  
**BIOLOGY - II Theory + 2 Second Year Science**

Section B - Zoology

Time : 1.5 hours

Full Marks : 35

Group A: (Objective Type- Compulsory)

Q1.- Multiple choice/ one word answer : 1 mark each x 5 = 5 marks

Q2.- Correct the sentences/ Fill up the blanks : 1 marks each x 5 = 5 marks

Group B: (Short Answer Type)

Q3.- Answer within three sentences : 2.5 marks each x 3 = 7.5 marks (3 bits to be answered out of 6 bits)

Q4.- Difference between (3 important differences) (1 bit to be answered out of 3 bits) : 3.5 marks = 3.5 marks

Group C: (Long Answer Type)

Answer two questions out of four : 7 marks x 2 = 14 marks

N.B: Long answer type questions are to be set only from the portions underlined in the syllabus.

**BIOLOGY - II (Zoology) Practical +2 Second year Science Detailed Syllabus**

**A. EXPERIMENTS/ OBSERVATIONS:**

1. To test the action of salivary amylase on starch;
2. To test the presence of urea sugar in urine/ given sample solution.
3. To determine the pH of three water samples collected from water bodies (using pH paper).

**4.**

**B. SPOTTINGS/ IDENTIFICATION:**

a. Study of specimens and identification with reasons- Shark, Rohu, Frog, Garden lizard, Cobra, Krait, Pigeon and Rat.

b. TS/ VS through spinal cord, ovary, testis, kidney, stomach .

c. appendicular skeleton of rabbit. (Girdles, Humerus, radius & Ulna, Femur, Tibia & Fibula.

**d.**

Book Recommended : Bureau's Higher Secondary (+2) Zoology, Practical, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

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**QUESTIONS PATTERN AND DISTRIBUTION OF MARKS BIOLOGY - II**  
**(Zoology) Practical + 2 Second Year Science**

Time : 2 hours

Full Marks : 15

1. Experiment (One experiment to be set from A) : 07 marks  
Theory and procedure - 03 marks  
Experiment, Observation and Results - 04 marks
2. Spotting (Two spots to be set from B) -1.5 marks each x 2 : 03 marks
3. Viva voce:03
4. Practical Record :02 marks

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